

# MINERALOGICAL ABSTRACTS

(Vol. 7, No. 2, June, 1938.)

## Notices of Books.

ROSTER (W. A.). *A text-book on crystal physics*. Cambridge (University Press), 1938, xxii+295 pp., 108 figs. Price 15s.

This volume is especially welcome as the first book in the English language to be devoted exclusively to some account of the various physical properties of crystals. It covers much the same ground as Voigt's classical 'Lehrbuch der Kristallphysik' [Min. Mag. **16**-253, 1925], which was largely theoretical, and with regard to practical applications in advance of its time. In the opening sentences of the present volume we read: 'Until recently crystals were only important commercially as jewels.' (No more is said on this subject, nor is any mention made of the use of quartz, calcite, and fluorite in optical instruments.) Now they are used as piezoelectric oscillators with several important practical applications; and single metal crystals are used for investigating the properties of metals. Great advances have been made possible since 1912 by the study of crystals with X-rays, and the correlation of structure with various properties. Separate chapters are devoted to Homogeneous deformation (thermal expansion and plastic deformation), Conduction (of heat and electricity), Induction (magnetic and electric), Some problems in crystal optics, Piezo-electricity, Pyro-electricity, and Elasticity. The treatment is mainly theoretical and mathematical, and except in parts is not easy reading. Good accounts are, however, given of experimental methods. The first chapter 'Application of tensor notation to crystal physics: transformation of vectors, and second and higher order tensors' is not a very encouraging opening to the general reader. The book is intended for university students, and contains much material for examination questions.

L. J. S.

REIBE (Adolf). *Piezoelektrizität des Quarzes*. Wissenschaftliche Forschungsberichte, Naturwiss. Reihe, Band 45, Dresden & Leipzig (Theodor Steinkopff), 1938, xii+233 pp., 175 figs. Price RM. 20 (bound RM. 21).

Piezoelectricity, first observed by the brothers J. and P. Curie in 1880, has shown remarkable developments during recent years, and it now has several important technical applications. A useful review is given of the work, both theoretical and practical, with 311 references to the

literature. These references are collected together at the end of the volume in the order quoted in the text, but without the titles of papers or any systematic arrangement. Patent literature is not included. Methods of detecting piezoelectricity are described, and long lists are given of substances, belonging to 21 crystal-classes devoid of a centre of symmetry, that have been tested with positive and negative results. The relations between the elastic and piezoelectric constants are discussed, and quartz as a resonator is considered in detail. Many diagrams illustrate the forms of apparatus and instruments. L. J. S.

HATCH (F. H.) [1864-1932] & RASTALL (R. H.). *The petrology of sedimentary rocks*. Third edition revised by Maurice BLACK. London (George Allen & Unwin), 1938, 383 pp., 75 figs. Price 15s.

This is a companion volume to Hatch and Wells 'The petrology of igneous rocks' [M.A. 6-434], being styled on the half-title as 'Text-book of petrology, vol. 2'; but although the two volumes have the same number of pages, the new volume is considerably thicker. The second edition of 1923 [M.A. 2-3] included also metamorphic rocks, leaving only 150 pages and 13 figs. for the sedimentary rocks themselves. The new edition has been entirely rewritten and very much enlarged, and its value and usefulness as a text-book correspondingly increased. This is largely on account of the considerable amount of work that has been done during recent years in connexion with petroleum occurrence. Chapters on the origin and classification of sedimentary deposits, thin mechanical analysis, and on the different types (rudaceous, arenaceous, argillaceous, ferriferous, calcareous, organic siliceous, chemical, carbonaceous, phosphatic, pyroclastic, and of modern oceans) are followed by chapters on Diagenesis and related processes, Weathering, residual deposits, and soils, which in previous editions were included in the section on metamorphism. In fact, no sharp line can be drawn between processes of consolidation, recrystallization, lithification, and metasomatism and those of metamorphism. An appendix on the minerals of detrital deposits written by T. Crook for the first edition has been revised by F. C. Phillips. A useful bibliography arranged according to authors is accompanied by an index of subjects; and there are in the text many other references to original literature. L. J. S.

WELLS (A. K.). *Outline of historical geology*. London (George Allen & Unwin), 1938, xiv+266, 2 pls., 99 text-figs. Price 12s. 6d.

'The earth has been likened to a projectile of nickel-iron with a thin

on of slag upon its surface.' This opening sentence in the introductory chapter would rather suggest a treatise on meteorites. The 'thin skin of slag' consists of a lower continuous basaltic shell and an upper discontinuous granitic shell. All that is considered in the present volume is the thinner surface layer of sedimentary rocks. But, according to the Stratigraphical Column given in fig. 4, this represents a period of 499 million years. Separate chapters are devoted to each of the geological systems; but after the Cambrian, Ordovician, and Silurian, we come back to the pre-Cambrian. There are also chapters on the Caledonian and American earth-movements, of importance as periods of ore deposition. The lithology of the rocks and the conditions under which they were deposited are considered, and mention is made of economic materials in igneous rocks belonging to each period. The book is written in a clear and interesting style and is very well illustrated. It will hold the attention of the general reader, and is an excellent text-book for undergraduate students.

L. J. S.

*Zeitschrift für angewandte Mineralogie.* Herausgegeben von F. K. DRESCHER-KADEN. Berlin (Borntraeger), 1937, Band 1, Heft 1, iv+96 pp. Price per vol. of 4-6 parts RM. 28.

The first number of this new periodical devoted to applied mineralogy contains the following original papers:

- W. Schmidt, Festigkeit und Verfestigung von Steinsalz.
- W. v. Engelhardt, Über die Schwermineralsande der Ostseeküste zwischen Warnemünde und Darsser Ort und ihre Bildung durch die Brandung.
- A. Claus, F. Hegemann und F. Rost, Über die quantitative spektrographische Bestimmung von Gold in Seifenproben.
- H. Witte, Zur Kenntnis der Kristallchemie von Legierungen. Untersuchungen auf dem Schnitt  $MgZn_2$ - $MgAg_2$ .
- E. Preuss, Spektralanalytische Bestimmung von Molybdän und Vanadin in Richelsdorfer Halden.

L. J. S.

ME (W. F.). *Geology of Egypt*. Vol. 2, part 3. *The minerals of economic value associated with the intrusive pre-Cambrian igneous rocks and ancient sediments*. Pp. i-xxxv+689-990+1-75 (index), pls. 159-196. Survey of Egypt, Cairo (Govt. Press), 1937. Price P.T. 250. [Cf. M.A. 6-241.]

This part, which in itself is a handsome volume, is still in the pre-Cambrian. The historical account of the use of gold, with descriptions of the ancient and recent mines, and theories of the origin of the deposits

occupy almost half the volume. Other ores mentioned are those of Au, Cu, Zn, Mo, W, Fe, Cr, Mn, Ni, Pb, Sn, and Pt. Information respecting precious and ornamental stones and rocks is summarized with reference to previous volumes. A special chapter deals with the bases of ancient Egyptian chronology, dating the stone age, and geological time. The interesting and beautiful illustrations, many of them in colour, are a special feature of the book. A fourth part of vol. 2 (pre-Cambrian) is in preparation.

L. J. S.

ITO (T.). *Beiträge zur Mineralogie von Japan*. Begründet von T. WADSWORTH. Neue Folge, no. 2. Tokio, 1937, xii+168 pp., 9 pls., many text figs. [Cf. M.A. 6-157.]

A collection of 52 papers by several authors dealing mainly with the crystallography of various minerals from Japanese and Korean localities. The Japanese text, with many drawings of crystals, tables of angles, and some chemical analyses, is followed by an English summary (pp. 14-168). Optical and X-ray data are given of several varieties of pyroxene and amphibole. Crystals of aegirine-augite from a region of alkali rocks in NE. Korea reach a length of  $1\frac{1}{2}$  m.

L. J. S.

### New Minerals.

HINTZE (Carl) [1851-1916]. *Handbuch der Mineralogie*. Ergänzungsband *Neue Mineralien*. Herausgegeben von Gottlob LINCK. Berlin and Leipzig (Walter de Gruyter & Co.), 1936-37, Lief. 3 and 4, pp. i-iv + 321-760, figs. 93-98. Price 16 Mk. each part. [Cf. M.A. 6-289.]

These two parts complete the supplementary volume dealing with new minerals described since the publication of the main series of volumes. W. Noll and H. Schnaase are added to the lists of compilers.

L. J. S.

[SHUBNIKOVA (O. M.)] Шубникова (О. М.). Новые данные о минералах и новые минеральные виды (1935 г. и I-VI 1936 г.) [*New data on minerals and new mineral species (year 1935 and January-June 1936.)*] Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сел. Хоз. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1936, no. 10, pp. 169-226. Russian with English index.)

A continuation of the compilation of data on new minerals, together with a more extensive collection of data relating to minerals previously known. [M.A. 7-9.]

L. J. S.

MALACHE (Charles) & FOSHAG (W. F.). *Antofagastite and bandylite, two new copper minerals from Chile*. Amer. Min., 1938, vol. 23, pp. 85–90, 2 figs. [These occur with atacamite as encrustations in rock crevices in a leaching zone above the massive iron sulphates in the Quetana mine near Calama, prov. Antofagasta. Antofagastite is orthorhombic,  $a:b:c = 0.9177:1:0.4631$ , usually in curved and vermiform shapes, with cleavages (110) perfect and (001) good, and bluish-green colour, Sp. gr. 4.1, H.  $2\frac{1}{2}$ ,  $\alpha$  (=  $b$ , bright green) 1.646,  $\beta$  (=  $c$ , olive-green) 1.685,  $\gamma$  (=  $a$ , pale blue) 1.745,  $2V\ 75^\circ$ , positive. Analysis agrees closely with  $\text{CuCl}_2 \cdot 2\text{H}_2\text{O}$  [M.A. 6–327]. Bandylite is tetragonal,  $a:c = 1:0.9070$ , with cleavage (001) perfect, as dark blue tabular crystals. Sp. gr. 2.810, H.  $2\frac{1}{2}$ ,  $\alpha$  (dark blue) 1.692,  $\epsilon$  (pale greenish-yellow) 1.640. The unit cell,  $a\ 6.13$ ,  $b\ 5.54\ \text{\AA}$ . contains  $\text{CuB}_2\text{O}_4 \cdot \text{CuCl}_2 \cdot 4\text{H}_2\text{O}$ ; space-group  $P4/nmm$ . Analysis gave  $\text{B}_2\text{O}_3\ 23.35$ , Cl 19.47,  $\text{SO}_3\ 0.05$ , Cu 34.94,  $\text{Fe}_2\text{O}_3\ 0.35$ , MgO 0.05, CaO 0.05,  $\text{Na}_2\text{O}\ 0.40$ ,  $\text{H}_2\text{O}\ 19.60$ , insol. 1.84 = 100.10. It is a double salt decomposed by water,  $\text{CuCl}_2$  going into solution and leaving a residue of copper borate.

L. J. S.

MALACHE (Charles). *Leightonite, a new sulphate of copper from Chile*. Amer. Min., 1938, vol. 23, pp. 34–37, 3 figs.

MACOCK (M. A.). *The relation of leightonite to polyhalite*. Ibid., pp. 38–45, 3 figs.

Leightonite was found as pale blue laths and cross-fibres in crevices at the large open cut at Chuquicamata. The crystals have an orthorhombic habit,  $a:b:c = 0.7043:1:0.4578$ ,  $\alpha$ ,  $\beta$ , and  $\gamma$  near  $90^\circ$ , but with lamellar twinning on (100) and (010) and optical orientation proving them to be really triclinic. Sp. gr. 2.95, H. 3,  $\alpha\ 1.578$ ,  $\beta\ 1.587$ ,  $\gamma\ 1.595$ ,  $2V\ 60^\circ$ , negative. Analysis,  $\text{SO}_3\ 49.33$ , CuO 11.97, CaO 18.41,  $\text{K}_2\text{O}\ 13.93$ ,  $\text{Na}_2\text{O}\ 0.56$ ,  $\text{H}_2\text{O}\ 5.71 = 99.91$ , gives  $\text{K}_2\text{Ca}_2\text{Cu}(\text{SO}_4)_4 \cdot 2\text{H}_2\text{O}$ . R. Görgey's (1915) measurements of polyhalite ( $\text{K}_2\text{Ca}_2\text{Mg}(\text{SO}_4)_4 \cdot 2\text{H}_2\text{O}$ ) give in a new setting  $a:b:c = 0.7176:1:0.4657$ ,  $\alpha\ 90^\circ\ 39'$ ,  $\beta\ 90^\circ\ 6\frac{1}{2}'$ ,  $\gamma\ 91^\circ\ 53'$ .

L. J. S.

ЕФРЕМОВ (N. E.) [Ефремов (H. E.)]. Азовскит—новый минерал из группы гидроферрифосфатов. *Azovskite—a new mineral from the group of hydroferriphosphates*. Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 151–155. (Russian with English summary.)

Azovskite occurs as reticulated veins, sometimes as nodules or shells,

in iron ore on the Taman shore of the Sea of Azov. It is dark brown with pitchy lustre and flat conchoidal fracture. Sp. gr. 2.5, H. 4, streak brown,  $n$  1.758. Analysis,  $P_2O_5$  15.90,  $Fe_2O_3$  52.73, FeO nil,  $Mn_2O_3$  1.68, Mg trace, CaO 2.84,  $SiO_2$  2.64,  $CO_2$  0.15,  $H_2O+$  11.87,  $H_2O-$  11.28 = 99.0 corresponds with  $FePO_4 \cdot 2Fe(OH)_3$ , or including water lost below  $110^\circ$   $FePO_4 \cdot 2Fe(OH)_3 \cdot 3H_2O$ . L. J. S.

[ЧУКХИРОВ (F. V.)] Чухров (Ф. В.). О составе и генезисе митридатита. *On composition and genesis of mitridatite*. Труды Ломоносов. Инст. Акад. Наук СССР, Мин. Сер. (Trans. Lomonossov Inst. Acad. Sci. U.S.S.R., Ser. Min.), 1937, no. 10, pp. 139–150. (Russian with English summary.)

A preliminary description of this mineral was given by S. P. Popov in 1910, and it was named mitridatite by P. Dvoichenko in 1914 [Zap. Krym. Obsheh. Est., vol. 4, p. 114]. It occurs as earthy yellowish-green nodules, veinlets, and shells in oolitic iron ore at Kamysh-Burun on the Kerch peninsula, Crimea. Analyses,  $P_2O_5$  30.61 (22.16),  $Fe_2O_3$  36.6 (31.57), FeO 0.52 (1.86),  $Mn_2O_3$  0.51 (0.53), MgO 0.96 (1.04), CaO 15.2 (9.66),  $SO_3$  0.08 (0.47),  $H_2O+$  8.82 (7.19),  $H_2O-$  4.26 (7.57),  $CaCO_3$  1.4 (4.68), insol. 0.32 (12.61), total 99.48 (99.34), approximate to the formula  $3CaO \cdot 2Fe_2O_3 \cdot 2P_2O_5 \cdot 5H_2O \cdot n$  aq, near to that of calcioferrite. Together with other minerals, it is an alteration product of vivianite. Arsenic and vanadium are not present in the Kerch phosphates because the primary minerals, vivianite and anapaite, were formed under reducing conditions. L. J. S.

ANTIPOV-KARATAJEV (I. N.) & SEDLECKIJ (I. D.). *On the genesis of colloidal metals in salt soils. Gedroitsite, a new mineral*. Comp. Rend. (Doklady) Acad. Sci. U.R.S.S., 1937, n. ser., vol. 17, pp. 251–254.

In salt soils the high content of alkali is perhaps present in a colloidal complex. A precipitate obtained by mixing solutions of impure 'water glass' and sodium aluminate is a permutite with the composition  $SiO_2$  42.29,  $Al_2O_3$  26.09,  $Fe_2O_3$  0.48, MgO 0.21, CaO 0.37,  $Na_2O$  13.73,  $K_2O$  7.38,  $SO_3$  0.60, Cl 0.20,  $H_2O+$  6.13,  $H_2O-$  4.8;  $SiO_2:Al_2O_3$  2.7. This gave no X-ray pattern, but after being kept for three years it showed many fine lines. The bulk of the material is isotropic with  $n$  1.483, some isotropic with  $n$  1.550, and a few minute anisotropic crystals. This artificial product is named gedroitsite. L. J. S.

### Meteorites and Tektites.

DE (F.). *Fortschritte in der Meteoritenkunde. I. Neue Meteoriten.* Fortschr. Min. Krist. Petr., 1937, vol. 21, pp. 225-275.

This review of the literature on meteorites is a continuation from 1922 [M.A. 2-32]; but the list of 122 new meteorites includes only those not in G. T. Prior's British Museum Catalogue of 1923-27 [M.A. 3-463], i.e. the ten years to the end of 1936. Several doubtful and undescribed meteorites are included; on the other hand, Kappakoola, Lake Labyrinth, and Silverton described in this Magazine are omitted. L. J. S.

EDS (Chester A.). *Catalogue of meteorites in the American Museum of Natural History as of October 1, 1936.* Bull. Amer. Mus. Nat. Hist., 1937, vol. 73, art. 6, pp. 517-671, 1 fig.

This collection has shown a rapid growth since the catalogue by E. O. Rømer (1896), when 45 specimens represented 26 falls. Now 546 falls are represented by 3744 specimens, including 2129 stones (0.2-6650 lbs) of the Holbrook, Arizona, shower of 1912. Many of the falls are represented by only small fragments; but here are preserved the Cape York (33.1 metric tons) and Willamette (14.2 metric tons) siderites, the Maize, Alabama, stone of 140.6 kg., and other unique specimens. The collection was transferred from the Dept. of Geology to that of Astronomy in 1935, and is now housed in the new Planetarium building. Much of the general information in the catalogue has been copied word for word from G. T. Prior's catalogue [M.A. 2-97, 3-463]. L. J. S.

ONARD (Frederick C.). *Further remarks on meteoritical terminology.*

Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 45-50.

The name meteorite is applied to a solid body both before and after it has reached the earth's surface. The name meteor is applied to the luminous phenomena when a meteorite passes through the earth's atmosphere. The study of meteorites is called meteoritics. The corresponding adjectives are meteoritic, meteoric, and meteoritical. A student of meteorites is a meteoriticist. [M.A. 6-387.] L. J. S.

ONARD] (F. C.). *Introducing the term meteoritelet.* Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, p. 54.

Cosmic bodies that are completely vaporized during their flight through the earth's atmosphere are called meteoritelets, as distinct from meteorites that reach the ground. L. J. S.

NININGER (Addie D.). *Meteorite discoveries reported to the Society Research on Meteorites from August 1933 to June 1937*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 449-454.

A list of 100 meteorites (78 of them from U.S.A.) supplements the given by H. H. Nininger in his book in 1933 [M.A. 5-400], bringing total of known meteorites up to 1127. The locality of each is stated with weight, date of fall or when found, but no references to the literature or authority.

L. J. S.

GORDON (Samuel G.). *Rocks from outer space*. Frontiers, Acad. Nat. Sci. Philadelphia, 1938, vol. 2, pp. 77-79, 4 figs.

A brief general account of meteorites. Ninety falls are represented in the Academy collection. [M.A. 6-204.]

L. J. S.

SCHWINNER (Robert). *Lehrbuch der physikalischen Geologie*. Band 1. *Die Erde als Himmelskörper: Astronomie, Geophysik, Geologie in ihren Wechselbeziehungen*. Berlin (Borntraeger), 1936, xii+356 pp., 1 pl., 62 text-figs.

This volume is mainly astronomical. Chapter V (pp. 107-163) is devoted to meteorites, with a discussion on their origin [M.A. 3-532] and an appendix on tektites. Chapter VI deals with the constitution of the earth.

L. J. S.

WILLS (R. G.). *Some effects of meteorites*. Proc. Liverpool Geol. Soc., 1936, vol. 17, pp. 2-9, 1 pl.

Presidential address on comets, meteorites, meteorite craters, and tektites. Late-evening glows were seen in Liverpool on June 30 and July 1, 1908. [M.A. 4-429; 6-16.]

L. J. S.

[KULIK (L. A.)] Кулик (Л. А.). Вниманию наблюдателей болидов [For the attention of observers of bolides.] Комиссия по метеоритам Акад. Наук СССР [Meteorite Commission, Acad. Sci. U.S.S.R.], 1937, 32 pp., 18 figs.

A brief account of comets, bolides, and meteorites, with detailed instructions for amateur observers for recording data. The two points noted include date, exact time, duration, place, intensity, color, shape, &c. Fig. 9 shows 66 stones, ranging in weight from about 10 to 30 grams, as part of the shower which fell at about 6 p.m. on December 26, 1933, over an area of  $4 \times 5$  km. near Pervomaisky, Ivanovo-Voznesensk district, govt. Vladimir [about  $57^{\circ}\text{N.}$ ,  $41^{\circ}\text{E.}$ ].

S. I. T.

NZ (Edward). *Number of fragments of the Pultusk meteorite*. Nature, London, 1937, vol. 140, pp. 113-114.

BETH (F. A.). *Meteorites: the number of Pultusk stones, and the spelling of "Widmanstätten figures"*. Ibid., pp. 504-505, 809.

NCER (L. J.). *Meteorites: the number of Pultusk stones, and the spelling of "Widmanstätten figures"*. Ibid., p. 589.

NARD (Frederick C.). *The spelling of "Widmanstätten figures"*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, p. 508.

The original account of the Pultusk shower on January 30, 1868, stated that 400 stones were collected, and a partial analysis gave 'silica soluble in HCl 47.014, silicates insoluble 52.986, total 100.000'. It was suggested that this total was miscopied as 100,000 for the number of stones that fell. A more probable estimate is about 3000. The second account argues that 100,000 is not an excessive estimate, considering that the weight of the 'Pultusk peas' weigh only a few grams. Widmanstätten, rather than Widmanstetter [Min. Mag. 23-333], is also argued. The third note points out errors in the calculations in (2), and that the best authorities of reference give Widmanstetter.

L. J. S.

CALLIEN (W. J.). *A note on the orientation of cone-shaped meteorites*. Trans. Geol. Soc. Glasgow, 1937, vol. 19, pt. 3 (for 1935-6), pp. 409-412, 2 figs.

With cone-shaped and pear-shaped meteorites (e.g. Boogaldi), as with stream-line bodies, the large end is directed forward and the apex behind during flight. Wood or metal cones supported at their centre of gravity assume this position of stability in an air current.

L. J. S.

GERGE (Gerhard) & KOMMEL (Arthur R.). *The structure of meteoric irons*. Amer. Journ. Sci., 1937, ser. 5, vol. 34, pp. 203-214, 9 figs. Back-reflection X-ray Laue photographs from plates of kamacite from the Cañon Diablo and Amalia Farm [= Bethany] siderites were taken for the purpose of determining the orientation of the kamacite (face-centred cubic  $\alpha$ -phase) and the taenite (face-centred cubic  $\beta$ -phase). The plotted poles of (110) are rather scattered, but they suggest that (110) and  $[1\bar{1}1]$  of kamacite are parallel to (111) and  $[1\bar{1}0]$  of taenite [M.A. 3-259, Min. Mag. 22-382]. A good Widmanstetter pattern was produced in a Ni-Fe alloy (27% Ni) by cooling for 12 hours at 1400° C. Metallurgical evidence indicates that the Widmanstetter structure of meteorites is due to slow cooling from high temperatures.

L. J. S.

BUDDHUE (John Davis). *Fused meteoritic iron*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 275-277, 1 fig.

A small piece of the Toluca(?) siderite was fused and afterwards polished and etched. It then showed a rather coarse granular structure.

L. J. S.

BUDDHUE (John Davis). *The composition of meteoritic iron sulphides*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 337-338, 1 fig.

A frequency plot of 31 published analyses shows a prominent maximum corresponding to FeS (troilite) and a secondary maximum at Fe<sub>10</sub>S<sub>9</sub> to Fe<sub>9</sub>S<sub>10</sub> (pyrrhotine); the latter, curiously, for analyses of material from siderites, in which solid solution of Fe, rather than S, in FeS would be expected.

L. J. S.

BUDDHUE (John Davis). *A probable occurrence of free copper in meteorite*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 103-106, 1 fig.

A block of iron labelled 'Greenland', but with characters similar to those of the Toluca (Xiquipilco) meteorite, showed a minute (0.1 mm) speck of metallic copper in a rim of schreibersite partly enclosing a troilite nodule. Analysis of the sawdust of the iron gave Fe 91.0, Ni 7.29, Co 0.10, S 0.09, P 0.08, C and SiO<sub>2</sub> (0.54) = 100.00, [Cf. M.A. 1-101.]

L. J. S.

BUDDHUE (John Davies). *The composition of meteors*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 166-169.

Spectra of comets show the lines of C, N, O, Na, and probably Fe, and those of meteors show Fe, Mg, Ca, Mn, Si, Cr, Al, and probably Co, Na, Ni, C, H, O, N, S. The so-called meteoritic dust, found as magnetic spherules in deep-sea deposits and on the Greenland coast, contains Fe, Co, Mg, Si. The probable relationship of meteors and meteorites suggests the presence of some other elements; but only Mazapil and perhaps the Rowton meteorites are supposed to have fallen during meteor showers.

L. J. S.

KING (Arthur S.). *A spectroscopic examination of meteorites*. Astrophysical Journ. Chicago, 1936, vol. 84, pp. 507-516.

Full details of a paper previously published in abstract [M.A. 6-35].

L. J. S.

OM (A. G.). *Über die geographische Verteilung der Eisenmeteorite.* Geogr. Ann., Svenska Sällsk. Antropol. Geogr., 1923, vol. 5, pp. 38-50.

preponderance of iron meteorites ( $\frac{1}{2}$  pallasites) as compared with meteorites in North America (69%), Central and South America (70%), Australia (81%), Siberia (77%), over that in Europe (14.2%), Japan (2.8%), is explained by the fact that the latter countries of older civilization, and that the irons have already been mined up. For the whole world the percentage of siderites+pallasites is 10%; but for observed falls only 4%. [Cf. M.A. 5-151.] L. J. S.

(Mohd. A. R.). *Comparison of meteorite falls during a.m. and p.m. hours.* Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, pp. 51-54, 1 fig.

Records up to 1932 show the following numbers of falls, with an average weight of 19.6 kg. for a.m. falls and 28.1 k.g. for p.m. falls. These are correlated with the greater relative velocity of a.m. falls.

|     |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|
| ... | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | 9  | 10 | 11 | 12 |
| ... | 6  | 2  | 3  | 4  | 9  | 6  | 15 | 20 | 17 | 16 | 20 | 37 |
| ... | 19 | 23 | 32 | 42 | 28 | 20 | 15 | 21 | 13 | 8  | 10 | 9  |

L. J. S.

IN (René). *Les météorites pierreuses ne peuvent fournir d'indication sur la nature des roches pierreuses.* Compt. Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 509-510.

The crust of the earth represents the degree of equilibrium attained between the metallic core and the gaseous atmosphere, absolute equilibrium being impossible by reason of the formation of a solid upper crust. Stony meteorites were presumably formed in similar fashion in other planet (or star), and could only accurately represent the composition of the deeper layers of the earth's crust if the conditions under which they were formed were identical with those prevailing within the terrestrial crust, which is highly improbable. They are therefore a safe guide as to the composition of the lower layers of the crust.

C. A. S.

(Sharat K.). *Additional notes on the question of living bacteria in stony meteorites.* Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 499-504.

Reply to C. B. Lipman [M.A. 5-391] and further discussion ridiculing the idea. L. J. S.

[KULIK (L. A.)] Кулик (Л. А.). Инструкция для наблюдения молнии (L'instruction pour observer la foudre.) Труд. Ломоносов. Инст. Наук СССР (Trav. Inst. Lomonossoff, Acad. Sci. U.R.S.S.), no. 2, pp. 83-87 (Russ.), 1 fig.

KULIK (L. A.). *Instructions for the observation of [high temperature and due to] lightning.* Translated by Lincoln LA PAZ and A. Ger WIENS. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 328-332.

The effect of lightning on trees has been considered in connexion with the burning of the Siberian forest on June 30, 1908. Other effects of lightning are seen in fulgurites [and in various fused objects which are thought to be meteorites]. Ball-lightning may be confused with fireballs.

L. J.

LLARENA (J. G. de). *Meteor-Fälle auf der Pyrenäen-Halbinsel.* Natur und Volk, Ber. Senckenb. Naturfor. Gesell., 1938, vol. 68, pp. 1-5 figs.

A review of the literature on meteorites fallen in Spain and Portugal with a list of 52 falls since the year 1300 (including fireballs for which no meteorites were found). A map shows their distribution, and details are given of falls by hours, months, and years. The Madrid museum has 175 specimens (not distinct falls) amongst which 20 Spanish falls are represented. [M.A. 2-36, 86, 260; 4-259; 5-297; 6-392.] L. J.

CARDOSO [G. Martín]. *Un siderito caída en Mallorca el 17 de julio de 1935.* Bol. Soc. Española Hist. Nat., 1935, vol. 35, pp. 453-454.

The fall was observed by a hunter at 11-37 a.m. on July 17, 1935, on the road from Palma to Manacor in Majorca, and from a depth of 90 cm he extracted a piece of iron weighing 809 grams. [No description of the material is given, and the record appears to be doubtful.] L. J.

CARDOSO [G. Martín]. *Sobre la caída de un meteorito en La Rinconada (Sevilla).* Bol. Soc. Española Hist. Nat., 1934, vol. 34, pp. 201-299.

A column of black smoke with a loud noise struck a hut at midday on February 17 (19 in the second note), 1934, breaking furniture and starting a fire. At a later date a mass the size of a chestnut, consisting of iron and iron sulphide, was found. [The record given in these short preliminary notes appears to be doubtful.] L. J.

DOLER (Josef). *Ein Meteorit saust in einer Spiralbahn zur Erde.* Natur und Volk, Ber. Senckenb. Naturfor. Gesell., 1938, vol. 68, pp. 1-8, 7 figs.

Popular account of the fall of the Prambachkirchen meteorite [M.A. 392]. The second explosion at a height of 10 km., with breaking off one corner, caused an alteration in the path and in the orientation of the meteorite during the last part of its flight. L. J. S.

КУЛИК (L. A.) [Кулик (Л. А.). Каменный метеорит „Жигайловка“.— КҮЛІК (KOOLIK) (L. A.). „Žigajlovka“ stony meteorite. Метеориты СССР, Акад. Наук (Meteorites of U.S.S.R., Acad. Sci.), 1935, no. 2, \$4 pp., 4 pls.

Historical details are given of the Zhigailovka (= Jigalovka = Khar-meteorite (50° 37.5' N., 35° 4.5' E.), which fell on October 12, 1787, wt. Kharkov. The specimen in the Academy of Sciences collection Moscow weighs 931 (921½ + 9½) grams. It is a white tufaceous chondrite with nickel-iron, olivine, pyroxene, feldspar, magnetite, graphite, siderite, troilite, and lawrencite. L. J. S.

К (L. A.). *The question of the meteorite of June 30, 1908, in central Siberia.* Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 559-562; Astron. Soc. Pacific, 1938, Leaflet 109, 7 pp. Recapitulation of earlier notes [M.A. 5-404, 6-401]. Mention is made of the finding of microscopic globules of nickel-iron and fused quartz at a depth of five metres in the southern swamp. Blue silica-glass containing traces of nickel was found in an excavated crater. L. J. S.

VERT (P.). *A new meteorite of the U.S.S.R.* Journ. Roy. Astron. Soc. Canada, 1937, vol. 31, pp. 364-365.

Stone weighing 1770 grams was found in 1937 partly embedded in ground near the village of Erofeevka, North Kazakh region, West Siberia (51° 52' N., 70° 21' E.). It is a dark chondrite with nickel-iron and some troilite. There is a thickening of the fused crust at the edge of the stone. It probably fell on February 8-9, 1925. L. J. S.

SON (Fletcher, Jr.). *The Kurumi (Japan) meteorite.* Nature, London, 1938, vol. 141, p. 475, 2 figs.

The meteorite fell with a rumbling and roaring sound about noon on July 27, 1930, in Kurumi village, near Miki, NW. of Kobe. One fragment (8 grams) fell through the roof of a house and was too hot to pick

up; another (36 g.) fell in a nearby ditch, raising steam. The stones are chondritic of 'light sky-blue tint with yellowish granular particles'.

L. J.

MARBLE (John Putnam). *The Osseo, Canada, meteorite*. Amer. Min., 1937, vol. 22, no. 12, pt. 2, p. [8]; 1938, vol. 23, p. 173 (Abstract).

A siderite found about 1934 in the Temiskaming district, Ontario, is a very coarse octahedrite with a few troilite nodules and rare schreibersite. The Neumann lines are bent in places.

L. J.

WYLIE (C. C.). *The meteor of February 16, 1930*. Popular Astronomy, Northfield, Minnesota, 1930, vol. 38, pp. 387-392, 1 fig. Further notes on pp. 246-247, 308-309.

This preliminary account of the Paragould meteorite [M.A. 5] gives a chemical analysis by K. W. Ray. The powdered material, 'heated to redness to expel water, gases, etc., and to oxidize the metallic particles', there being a gain of 0.62% in weight.  $\text{SiO}_2$  40.56, Fe (Ti, Mn, Cr, P not separated) 28.37,  $\text{Al}_2\text{O}_3$  2.30, NiO 1.82, MgO 25.00, CaO 2.23,  $\text{Na}_2\text{O}$  0.63,  $\text{K}_2\text{O}$  0.37 = 99.68. The time of fall is here given as 16.08 on February 16 (astronomical noon to noon reckoning), 4.8 a.m. on February 17 (Central Standard Time). No complete account has yet been given of this, the largest known meteoric stone. L. J.

LONSDALE (John T.). *The Plantersville meteorite, Grimes County, Texas*. Amer. Min., 1937, vol. 22, p. 213 (abstract), pp. 877-888, 13 figs. [Cf. M.A. 6-397.]

This stone weighing 2084.9 grams was observed to fall at 4.0 p.m. on September 4, 1930, and was 'milk-warm' when picked up a few minutes later. It was found in the forest where tree branches had been freshly broken, and was not completely buried in the hard clay soil. The fall is subconical with radiating thread lines on the front and a thicker crust on the back. It is a veined white chondrite. Several types of chondrites are distinguished in the fine-grained groundmass. Hypersthene  $\gamma$  1.678,  $\gamma-\alpha$  0.013, 2V large, negative. Monoclinic pyroxene in small amount has  $\gamma : c = 28^\circ$ . Olivine (47.93%;  $\text{MgO}:\text{FeO} = 3.5:1$ ) has  $\gamma$  1.707,  $\gamma-\alpha$  0.038, 2V large, negative. Analyses by F. A. Gonyer of the metallic portion and the soluble and insoluble silicates gave the bulk composition:  $\text{SiO}_2$  35.87,  $\text{Al}_2\text{O}_3$  2.18,  $\text{Cr}_2\text{O}_3$  0.03, FeO 12.10, NiO 0.10, MnO 0.18, MgO 23.57, CaO 1.97,  $\text{Na}_2\text{O}$  1.05,  $\text{K}_2\text{O}$  0.12,  $\text{P}_2\text{O}_5$  0.05, 16.99, Ni 1.92, Co 0.06 (nickel-iron 18.97;  $\text{Fe}:\text{Ni} = 9.1:1$ ), Fe 2.53, S 1.00.

ite 3.98), Cu, P traces = 100.08. Spectrum analysis showed also  
and Ti. L. J. S.

NGER (H. H.). *The Norfolk, Arkansas, meteorite, an iron of witnessed fall*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 562-567, 3 figs.

A meteorite was seen to fall in October 1918 near Norfolk, Baxter Co., at the junction of North Fork and White River ( $36^{\circ} 12' \text{ N.}$ ,  $92^{\circ} 17' \text{ W.}$ ), a broken fragment now weighing 1050 grams was dug out at a depth of four feet. It shows a fresh bluish-black crust with stream lines on one side, and a thickening of the crust at the edge of a second deeply pitted surface; a third surface is a fresh fracture. A polished and etched specimen shows the structure of a medium octahedrite with an outer reaction zone 1-7 mm. thick. This is the fifth siderite observed to fall in North America (two other records are doubtful, including Norfolk, Virginia). L. J. S.

NGER (H. H.) & CLEMINSHAW (C. H.). *Some new California aërolites: Muroc and Muroc Dry Lake*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 273-275, 1 fig.

Three small stones were found on the surface of the desert 5 miles E. of Muroc (60 miles N. of Los Angeles). They are chondrites with metallic surfaces. Two pieces, 165 and 58 grams, found 15 feet apart, are called Muroc Dry Lake. The third piece, 18.4 grams, found 75 feet away, is very different in the character of the crust and the stony material, and is considered to represent another fall, called Muroc. The stones possibly have been transported by Indians. L. J. S.

NGER (H. H.). *Meteorites in Wyoming*. Mines Magazine, Colorado School of Mines, Golden, Colorado, 1937, vol. 27, pp. 16-20, 8 figs. Only one meteorite (Silver Crown) has hitherto been known from Wyoming. Four new ones are now described. *Willow Creek* ( $43^{\circ} 28' \text{ N.}$ ,  $104^{\circ} 46' \text{ W.}$ ), Natrona Co., a siderite of 112½ lb. (51 kg.) recognized in 1890 and found about 20 years before. Small spindle-shaped bars of taenite are surrounded by a very narrow band of plessite. The dominant plessite fields show a distinct octahedral structure in their central portion. *Clareton* ( $43^{\circ} 41' \text{ N.}$ ,  $104^{\circ} 42' \text{ W.}$ ), Weston Co., a grey chondritic stone weighing 1050 grams. *Hawk Springs* ( $42^{\circ} 47' \text{ N.}$ ,  $104^{\circ} 47' \text{ W.}$ ), 'Goshen Co.' [the position given by the latitude and longitude of Niobrara Co.], three fragments fitting together, total weight 367

grams, were found in 1935; it is a dark brown, almost black stone with abundant grains of nickel-iron and troilite, and some chondrules; sp. gr. 3.596. *Albin* ( $41^{\circ} 30' \text{ N.}$ ,  $104^{\circ} 6' \text{ W.}$ ), Laramie Co., a pallasite weighing 83 lb. (37.7 kg.), recognized in 1935 and found in 1915. The olivine in a mesh of nickel-iron are clearer than usual, and the larger ones (up to 37 mm.) are often divided by thin sheets of troilite, nickel-iron, and schreibersite. L. J. S.

BRADY (L. F.). *An unusual oxidized mass of Canyon Diablo, Arizona, containing iron*. Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, no. 1, p. 110.

Traces of Widmanstetter structure are still visible in the completely oxidized material. L. J. S.

GALOPIN (R.). *Une météorite nouvelle: l'holosidérite d'Union*. Schweiz. Min. Petr. Mitt., 1937, vol. 17, pp. 182-195, 2 pls., 1 text-fig.

BUFFLE (J.-Ph.). *La composition chimique de la météorite d'Union (Chili)*. Ibid., pp. 196-201.

A mass of iron weighing 22 kg. was found about 1930 by nitrate prospectors about 50 km. north of Union on the railway between Antofagasta and Calama [i.e. at about  $22\frac{1}{2}^{\circ} \text{ S.}$ ,  $69\frac{1}{2}^{\circ} \text{ W.}$ ]. A thin crust of limonite covers the surface, and a fracture at one end shows a cubic cleavage. The interior consists almost entirely of kamacite showing Neumann lines and nodular patches at different stages of etching, and enclosing minute crystals of troilite, rhabdite and schreibersite. Analysis gave Fe 95.06, Ni 4.66, Co 0.00, S 0.02, P 0.02, Si trace = 99.97; sp. gr. 7.50. The meteorite is a hexagonal kamacite-hedrite similar to Mejillones [Min. Mag. 8-257; M.A. 3-95] from the same region. L. J. S.

ALDERMAN (A. R.). *The Carraweena, Yandama, and Cartoonk meteoric stones*. Rec. South Australian Mus., 1936, vol. 5, no. 2, pp. 537-546, 7 figs.

Carraweena, South Australia.—A stone weighing  $63\frac{1}{2}$  lb. [28.8 kg.] was found in 1914 about 6 miles SW. of Carraweena ( $29^{\circ} 10' \text{ S.}$ ,  $140^{\circ} 0' \text{ E.}$ ). The rusty-brown material consists of enstatite, olivine, nickel-iron, troilite, and glass; chondrules are plentiful. Analysis gave Fe 12.75, S 1.10, troilite 5.72 (Fe 3.64, S 2.08),  $\text{SiO}_2$  38.08,  $\text{TiO}_2$  trace,  $\text{Al}_2\text{O}_3$  5.50, FeO 5.78, MnO 0.20, MgO 24.72, CaO 2.06,  $\text{Na}_2\text{O}$  1.88,  $\text{K}_2\text{O}$  0.48, Cr 0.46,  $\text{P}_2\text{O}_5$  0.22,  $\text{H}_2\text{O}$  0.88 = 100.32; sp. gr. 3.43. Yandama, New South Wales (near border of South Australia).—A stone weighing 12 lb. 9 [5.8 kg.] was acquired in 1914. It consists of olivine, hypersthene,

little nickel-iron, and troilite, with ill-defined chondrules and much iron matrix. Analysis gave Fe 5.93, Ni 0.56, troilite 5.23 (Fe 3.33, S 1.90), SiO<sub>2</sub> 37.99, TiO<sub>2</sub> trace, Al<sub>2</sub>O<sub>3</sub> 7.36, FeO 14.18, MgO 21.20, CaO 2.00, Na<sub>2</sub>O 1.16, K<sub>2</sub>O 0.47, P<sub>2</sub>O<sub>5</sub> 0.22, H<sub>2</sub>O 2.59 = 98.89; sp. gr. 3.40. Carraweena, New South Wales.—This stone of 10¼ oz. [290 grams] also found in 1914 from the Yandama station (29° 45' S., 141° 2' E.) and shows no differences from the Yandama stone [but it may belong to the same shower]. A list (with map) is given of thirteen meteorites from New South Wales. Accalana is a stone of 6¼ lb. (29° 15' S., 139° 58' E.), Artracoona a stone of 45 lb. 14 oz. (29° 4' S., 140° 0' E.), both of them very similar to Carraweena [and perhaps belonging to the same shower; cf. *Mag.*, 24–361]. 'Glen Osborne' is discredited. Four meteorites are listed from Central Australia, including Alikatnima, an iron, two stones, 20 lb. and 15 lb., in the South Australian Museum, and a third from Central Australia.

L. J. S.

ARMSTRONG (A. W.). *The Artracoona meteorite*. Trans. Roy. Soc. South Australia, 1936, vol. 60, pp. 73–75, 1 pl.

This is somewhat weathered, complete stone weighing 45 lb. 14 oz. (1290 grams) was found in 1914 at 8 miles NW. of the old Carraweena Station (29° 11' S., 139° 59' E.) and 6 miles W. of Artracoona Hill. It is very similar to the Carraweena and Accalana stones from the same shower. The material is compact and dark brown with light chondrules (1–2 mm.) which break with the matrix. The finely granular matrix consists of olivine (2V 80–85°, negative), hypersthene (2V near 90°), and conspicuous plagioclase (Ab<sub>65</sub>An<sub>35</sub>). Haematite is prominent in veins and cavities. The bulk composition is SiO<sub>2</sub> 37.80, Al<sub>2</sub>O<sub>3</sub> 4.21, Fe<sub>2</sub>O<sub>3</sub> 12.48, FeO 12.48, MgO 23.43, CaO 1.77, Na<sub>2</sub>O 1.14, K<sub>2</sub>O 0.10, H<sub>2</sub>O + H<sub>2</sub>O— 0.50, P<sub>2</sub>O<sub>5</sub> 0.22, NiO 0.13, CoO trace, Cr<sub>2</sub>O<sub>3</sub> 0.51, CO<sub>2</sub> 0.42, S 0.4, FeS 5.50, Fe 1.68, Ni 0.10 = 99.47; sp. gr. 3.52. Mineral composition: olivine (Mg : Fe = 9 : 1) 29.5, hypersthene (Mg : Fe = 73 : 27), 27.5, plagioclase 16.2, pyrrhotine 5.5, ferric oxide 17.7, carbonates 0.9, nickel-iron 1.8, chromite 0.8. The meteorite is classed as a black chondrite with a little nickel-iron.

L. J. S.

ARMSTRONG-SMITH (T.). *An unrecorded meteorite from Coolac, New South Wales*. Rec. Australian Mus., 1937, vol. 20, pp. 130–132, 1 pl., 1 text-fig.

A mass of iron weighing 19.28 kg. was found about 1874 by a gold prospector 3 miles W. of Coolac, County Harden (34° 58' S., 148° 7' 30"

E.). For several years it had been used as a stop in an open fireplace. The polished and etched surface shows only traces of Widmanstätten structure marked out by remnants of taenite, the kamacite and rim of the taenite being granulated, evidently as a result of the heat treatment. The grains average 3 mm. across. When dissolved in HCl, an odour of hydrocarbons was noticed, and a residue of graphite, cohenite (0.79%), and enstatite. Analysis gave Fe 92.79, Ni 4.72, Co 0.26, S 1.1, P 0.06, C (free) 0.01, C (combined) 0.67, silicates 0.33 = 100.11; spinel 7.15. Deducting iron for sulphide and carbide, the ratio Fe:Ni is 100:1.

L. J.

LACROIX (Alfred). *Sur une chute de météorite pierreuse en Nouvelle Calédonie le 15 juillet 1936*. Compt. Rend. Acad. Sci. Paris. 1937, vol. 204, pp. 625-626.

LACROIX (A.). *La chute de météorites de Nassirah, N<sup>ve</sup> Calédonie le 15 juillet 1936*. Bull. Soc. Franç., Min., 1937, vol. 60, pp. 226-227.

A meteorite fell between 4.30 and 5.0 p.m. on July 15, 1936. Nassirah, 85 km. NW. of Noumea, of which two fragments (323 and 19 g.) were recovered. It is a pliosideriferous chondrite with grey texture, containing small blackish-grey chondrules embedded in a tuffaceous mass traversed by black thread-like veins; density 3.678. It contains about 12.6% nickel-iron, mainly as kamacite bordered with taenite, and 3.9% of pyrrhotine, both very irregularly distributed. The chondrules consist largely of bronzite; there is no feldspar, but considerable merrillite.

C. A.

BARRINGER (D. Moreau, Jr.). *Meteor craters*. Frontiers, Acad. Nat. Sci., Philadelphia, 1938, vol. 2, pp. 80-82, 2 figs.

A brief general account of meteorite craters.

L. J.

WASHBURN (Chester W.). *Salt domes, meteor craters, and cryptovolcanic structures*. Bull. Amer. Assoc. Petroleum Geol., 1937, vol. 21, pp. 629-630.

Criticism of Boon and Albritton [M.A. 6-399].

L. J.

MADIGAN (C. T.). *The Boxhole crater and the Huckitta meteorite. (Central Australia)*. Trans. Roy. Soc. South Australia, 1937, vol. 61, pp. 187-190, 2 pls., 2 text-figs.

In June 1937 a meteorite crater was recognized on Boxhole station (22° 37' S., 135° 12' E.), near Plenty river and 170 miles NE. of Alice Springs. It is circular, 570-575 feet across the rim, and, being situated

loping ground, the depth varies from 30 to 52 feet. The rim is 9–16 feet above the surrounding ground, and the inner sides slope at 16–25°. The walls consist of gravelly alluvium with no broken blocks of the underlying gneiss and quartzite, and they have evidently been much worn down by weathering. A few iron-shale balls and fragments of meteoric iron have been found. [A mass of 181 lb. has since been acquired for the British Museum collection.] The meteoric iron shows the texture of a medium octahedrite very similar to that from Henbury. Mention is made of a coarse-grained pallasite, weighing over two pounds, found in July 1937 on the Huckitta station, 40 miles NE. of Adelaide. This has been transported to Adelaide. L. J. S.

WERNER (Werner). *Der Meteoritenkrater von Sall auf Ösel*. Petermanns Geogr. Mitt., 1934, vol. 80, p. 372.

Brief review of earlier papers. [M.A. 5–17, 149, 301.] L. J. S.

CLYDE (Clyde). *The meteor-craters in Estonia*. Nat. Hist., Amer. Mus. Nat. Hist., 1936, vol. 38, pp. 292–299, 10 figs.

*Exploring Estonian meteor craters*. The Sky, Amer. Mus. Nat. Hist., 1938, vol. 2, no. 5, pp. 8–9, 28–30, 10 figs.

Popular article giving an account of the author's visit to the locality in Estonia. Meteoritic material has since been found. [M.A. 5–17, 301.]

L. J. S.

WALTER (Walter). „*Krater von Sall auf Ösel, wahrscheinlich „Meteoritenkrater“*“. Gerlands Beitr. Geophysik, 1937, vol. 51, pp. 50–55, 1 fig. Specimens of brecciated and powdered dolomite from the Sall crater on the island of Oesel, Estonia [M.A. 5–17, 301], are described, and the origin of the crater is discussed. As with the Steinheim basin and the Ries, a meteoritic origin is probable. L. J. S.

WALD (I. A.). *Der Krater von Sall (Kaali järv)—ein Meteorkrater-Feld in Estland*. Natur und Volk, Ber. Senckenb. Naturfor. Gesell., 1938, vol. 68, pp. 16–24, 7 figs.

Popular review of previous papers [M.A. 5–17, 301]. Brief mention made of the discovery in 1937 of thirty fragments (0.1–24 grams) of meteoritic iron in two of the craters [Min. Mag. 25–75]. L. J. S.

RIE (Ethel D.). *Specimens from the Henbury meteorite craters, Central Australia*. Trans. Geol. Soc. Glasgow, 1937, vol. 19, pt. 3 (for 1935–36), p. 505.

Brief account of material in the Hunterian Museum. L. J. S.

BINGHAM (William F.). *Summary of findings from exploration, geophysical survey, and test-drilling at meteor crater, Arizona*. Pan-Am Geol., 1937, vol. 68, pp. 196-198.

Electric and magnetic surveys and borings suggest the presence of broken meteoritic material at a depth of 675-1375 feet. No deep cores have been obtained, but sludge samples show the presence of nickel and iron. [M.A. 5-302, 6-400.] L. J. S.

STUTZER (O.) [1881-1936]. "*Meteor Crater*" (Arizona) u. Nördlinger Ries. Zeits. Deutsch. Geol. Gesell., 1936, vol. 88, pp. 510-511, 2 pls., 2 text-figs.

STUTZER (Otto). *Der Meteor-Krater in Arizona*. Natur und Völk. Senckenb. Naturfor. Gesell., Frankfurt a. M., 1936, vol. 66, pp. 442-453, 6 figs.

A general account is given of the Arizona crater with some new details. This is compared with the Nördlinger Ries (21 km. across) and Steinheim basin (2½-4 km. across) in Swabia [M.A. 5-410], and these are believed to be meteorite craters of Miocene age. The tuffs (suevites) of the Nördlinger Ries are supposed to be rocks fused by the impact of the meteorite. L. J. S.

WYLIE (C. C.). *A peculiar hole near Tiffin, Iowa*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 445-449, 2 figs.

An oval depression, 100×75 feet across and 8 feet deep, in glacial sand and gravel is perhaps a meteorite crater, other suggested modes of origin being eliminated. Borings in the rim showed the presence of some iron oxide. L. J. S.

NININGER (H. H.). *Further notes on the excavation of the Haviland Kiowa County, Kansas, meteorite crater*. Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, p. 110.

Numerous small concretionary masses have been found at distances up to a mile from the crater [M.A. 6-15]. They consist of soil grains cemented by iron oxides and with a dark central spot. A chemical analysis shows the presence of nickel. [Cf. M.A. 4-264, 426.] L. J. S.

KRANZ (Walter). *Steinheimer Becken, Nördlinger Ries und „Meteor crater"*. Petermanns Geogr. Mitt., 1937, vol. 83, pp. 198-200, 1 pl.

A meteoritic origin for these basins [M.A. 5-410, 6-410] seems to be more probable than a volcanic or one due to subsidence. Deep bor-

ld be made on the chance of finding large quantities of meteoritic  
rial of possible economic value. L. J. S.

ZER (Otto) [1881–1936]. *Die Talweitung von Köfels im Ötztal (Tirol)*  
*als Meteorkrater*. Zeits. Deutsch. Geol. Gesell., 1936, vol. 88, pp.  
523–525.

the widening of the Oetz valley, by 4 km. along a length of 3 km.,  
the debris of blocks of gneiss and fused rock ('pumice') are believed  
e due to the fall of a meteorite at the end of the glacial period.  
[M.A. 6–401.] L. J. S.

IDT (Walter). *Bemerkung zur Arbeit von F. E. Suess, „Der Meteor-  
krater von Köfels bei Umhausen im Ötztale, Tirol“*. Zentr. Min.,  
[Abt. B, 1937, pp. 221–222.

the dislocation and 'pumice' [M.A. 6–401] are at the intersection of  
lines of tectonic weakness, where volcanic action would be expected,  
ough there is no evidence of such action in any other Alpine region.  
L. J. S.

MER (Wilhelm). *Über einen neuen Versuch zur Lösung des Köfelser  
Problems*. Verh. Geol. Bundesanst. Wein, 1937, pp. 195–206.  
Nachtrag, pp. 268–269.

the supposed meteorite crater of Köfels in Tirol [M.A. 6–401] is not  
antiated. The 'pumice' has more the character of a volcanic rock,  
at contains no trace of nickel. The form of the ground is not that  
crater. Volcanic rocks are not uncommon in mountain ranges.  
L. J. S.

KL (Oskar). *Untersuchung des Binssteins von Köfels auf Nickel*.  
*Zur Nickelbestimmung in Silikatgesteinen*. Verh. Geol. Bundesanst.  
Wien, 1937, pp. 269–270.

the nickel was detected in the 'pumice' or in the associated gneiss  
the supposed meteorite crater at Köfels, Tirol [M.A. 6–401]. The  
thylglyoxime test was applied to the sesquioxides in the presence  
monia and tartaric acid. [M.A. 5–521.] L. J. S.

VER (N. R.). *The geology of the Bosumtwi caldera and surrounding  
country*. Bull. Geol. Surv. Gold Coast, 1937, no. 8, pp. 5–37, 6 pls.,  
3 maps.

detailed account of this crater finally disposes of the idea that it  
formed by the fall of a meteorite [M.A. 5–150, 409; 6–401]. Volcanic

agglomerates and tuffs with pumice have been found in two isolated areas, but breccias of the surrounding granite and pre-Cambrian plutites have been observed in many places. In this cryptovolcanic structure an intrusive mass caused an uplift, followed by a brief explosive period, and finally sinking of the magma column. L. J.

M[ILLMAN] (P. M.). *The Carolina bays and their supposed meteoric origin*. Journ. Roy. Astron. Soc. Canada. 1936, vol. 30, pp. 57-59.

Several objections are raised to the meteoritic origin. [M.A. 6-40] L. J.

MACCARTHY (Gerald R.). *The Carolina bays*. Bull. Geol. Soc. Am. 1937, vol. 48, pp. 1211-1226, 9 figs.

The several theories of the formation of the 'bays' are mentioned, but the meteoritic theory is supported. High magnetic values have been recorded (W. F. Prouty, Journ. Geol., 1935, vol. 43, p. 200) near some of the bays, but not in line with the major axis of the ellipse. It is suggested that the bays were formed by aerial shock-waves produced by a swarm of bodies travelling with a velocity greater than the speed of sound, and that the meteorites passed underground along a curved track. [M.A. 5-303, 408; 6-16, 401.] L. J.

JOHNSON (Douglas). *Rôle of artesian waters in forming the Carolina bays*. Science, New York, 1937, n. ser., vol. 86, pp. 255-258.

It is suggested that artesian springs played a part in the formation of the lakes. [M.A. 6-401.] L. J.

SPENCER (L. J.). *Meteorites and the craters on the moon*. Nature, London, 1937, vol. 139, pp. 655-657.

An objection often raised against the view that the craters on the moon have been formed by the fall of meteorites is that they are not circular in outline and none are oval. It is pointed out that meteoritic craters, being formed by gaseous explosions, are circular. Another objection is that the earth's surface is not pock-marked in the same fashion. But with the absence of water and an atmosphere on the moon there can be no denudation, although insolation must be intense. The bright streaks radiating from some lunar craters are suggested to be due to myriads of tiny spheres of shining metal formed by the vaporization of siderites; craters not showing these streaks having been formed by stony meteorites. With the absence of an atmosphere, meteorites will encounter no check in their velocity; they will not be reduced

and stony masses will not be broken up before they reach the  
ce. L. J. S.

ANGER (H. H.). *A reply to Dr. L. J. Spencer's paper on "Meteorites and the craters on the moon"*. Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, pp. 107-109.

While agreeing that the circular craters on the moon are explosion  
ers, it is argued that meteorite craters on the earth are not necessarily  
lar in outline. Some meteorites will approach the earth's surface  
very low angle, and different degrees of temperature will be de-  
ped depending on the velocity at impact. L. J. S.

(Willy). *How the moon got its craters*. Nat. Hist., Amer. Mus. Nat.  
Hist., 1937, vol. 39, pp. 275-279, 8 figs.

Repeating the experiments of A. Wegener [1921], craters of impact,  
lar to meteorite craters and the craters on the moon, were formed by  
eping spoonfuls of cement dust on to a surface of the same material.  
en plaster of Paris was dropped, this was seen to spread beyond the  
for a distance 15 times the diameter of the crater. L. J. S.

ETH (Fritz), PETERSEN (K. W.), & CHLOUPEK (Jaroslav). *Helium-  
Untersuchungen, VI. Mitteil.: Über den Helium-Gehalt von "Molda-  
viten" und künstlichen Gläsern*. Ber. Deutsch. Chem. Gesell., 1929,  
vol. 62, pp. 801-809. [Cf. M.A. 4-122, 428; 5-7.]

Moldavites from Bohemia when heated at 1000° C. or fused with  
CO<sub>2</sub> yield the rare gases He, Ne, Ar, part of which has been absorbed  
a the atmosphere. The excess of He ( $1.6 \times 10^{-5}$  c.c. per gram of  
erial) gives no indication of the geological age. L. J. S.

ALD (Jan). *Stará a nová naleziště vltavínů moravských a českých*.  
[Old and new localities of Bohemian and Moravian moldavites.]  
Časopis Národního Musea, Praha, 1936, vol. 110, pp. 69-86, 2 figs.  
particulars are given of 12 localities (2 new) for moldavites in Moravia  
of 35 (11 new) in Bohemia; six other localities in Bohemia are doubt-  
The localities are marked on two maps. The surface features of the  
lavites are noted for each locality. F. S.

OSCHEK (Robert). *Die Moldavitschotter in Mähren*. Mitt. Geol.  
Gesell. Wien, 1937, vol. 29 (for 1936), pp. 329-356.  
laboration of a preliminary note [M.A. 6-18]. L. J. S.

KASPAR (Jan) [i.e. KAŠPAR (J. V.)]. *Czechoslovakian tektites and problem of their origin: an up-to-date résumé of the question*. Popular Astronomy, Northfield, Minnesota, 1938, vol. 46, pp. 47-51, 52.

The different types of sculpturing on the surface of moldavites ascribed to corrosion during flight through the air, rather than to subsequent chemical corrosion in the soil. Differences between the shapes, and sculpturing of western (Bohemia) finds and eastern (Moravia) finds suggest that moldavites were melted from the surface of a glass meteorite travelling from west to east. L. J. S.

KOENIGSWALD (G. H. R. von). *De glasmeteorieten van Nederland en Indië*. Natuurkundig Tijdschrift voor Nederlandsch-Indië, Batavia, 1936, vol. 96, pp. 283-296.

The tektites ('javaites') from Solo in central Java [M.A. 6-403] have the form of balls or drops, but there are many irregular fragments, and a pitted sculpturing less deep than on billitonites. Pieces over 100 grams in weight are rare, and the largest is barely 750 grams. They contain 76%  $\text{SiO}_2$  and appear to be intermediate between billitonites and australites. L. J. S.

HARDCASTLE (H.). *The origin of australites. Plastic sweepings of a meteorite*. New Zealand Journ. Sci. Techn., 1926, vol. 8, pp. 66-73, 13 figs.

An attempt is made to explain the forms of australites by the sweeping off of fused material from the surface of a large meteorite of the same composition. L. J. S.

FENNER (Charles). *Australites: are they glass meteorites?* Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 504-507.

A general review of the tektite problem with special reference to australites, giving details from the author's previous papers [M.A. 6-208]. The form of australites suggest two periods of fusion. A cosmic origin is insisted upon. [See Min. Mag. 25-82.] L. J. S.

FENNER (Charles). *Australites: a unique shower of glass meteorites*. R. Soc. Brit. Assoc. Adv. Sci., 1937 (Nottingham, 1937), p. 356 (abstract). [See Min. Mag. 25-82.]

SPENCER (L. J.). *The tektite problem*. Popular Astronomy, Northfield, Minnesota, 1936, vol. 44, pp. 381-383. Reprinted in Min. Mag. 24-503.

CKER (George). *Tektites from the Sherbrook river district, east of Port Campbell*. Proc. Roy. Soc. Victoria, 1937, n. ser., vol. 49, pp. 165-177, 8 figs.

At this locality, 154 miles SW. of Melbourne, 83 australites were recently collected on an area of  $4 \times \frac{3}{4}$  miles; 38 were found on the surface of an old road, suggesting that they were recent falls (but an addendum states that 52 more were later found on ground previously searched). The forms are buttons, lenses, ovals, boats, canoes, dumb-bells, tear-drops, and fragments [M.A. 6-18, 208]. Measurements, weight, and sp. gr. are given for each piece. The total weight of the 83 pieces is 10,000 grams and the average sp. gr. 2.391 (range 2.239-2.452). Sketches are given of the flow structures seen on the broken surfaces. It is suggested that the fragments were broken during flight. Bubbles are present (one of 7 mm. diameter in a 'button'), with smooth walls marked by flow lines.

L. J. S.

DEWHUE (John Davis). *Doubtful meteorites*. Popular Astronomy, Northfield, Minnesota, 1937, vol. 45, pp. 106-110.

Mention is made of the nickel-rich Santa Catharina (Brazil) and Osage County (Mississippi) irons, and of various masses of iron meteorites from nickel. Mention is also made of tektites.

L. J. S.

### X-rays and Crystal-structure.

LOHRMANN (C.), LOHRMANN (O.), & PHILIPP (H.). *Strukturbericht. Band II, 192-1932*. Heft 5-6, pp. 599-963. Zeits. Krist., 1937, Ergänzungsband 2.

FRIED (C.). *Strukturbericht. Band IV, 1936*. Heft 1-3, 346 pp., 208 figs. Zeits. Krist., 1938, Ergänzungsband 4.

The two parts completing vol. 2 deal with alloys and organic compounds, and include detailed indexes of authors, materials, and chemical formulae. Vol. 4, for 1936, is completed, including elements, inorganic compounds, alloys, and organic compounds, with indexes. [Cf. M.A. 104.]

L. J. S.

ALL (R.). *Eine vereinfachte Formel zur röntgenographischen Teilchengrößenbestimmung*. Zeits. Krist., 1936, vol. 95, pp. 455-456.

The author gives a simplified shape to a formula obtained in an earlier paper. [M.A. 4-360].

H. H.

TRZEBIATOWSKI (W.). *Precyzyjne oznaczenie stałych sieci przestrzeni diamentu i grafitu.*—*La détermination précise des constantes réticulaires du diamant et du graphite.* Roczniki Chemii, Warszawa, 1937, vol. 17, pp. 73–82, 3 figs. (Polish with German summary.)

The lattice constant of diamond is  $a$  3.5596 Å. at 19–20° C. and 3.5637 Å. at 480° C. Ceylon graphite at room-temperature has  $a$  2.44,  $c$  6.695<sub>6</sub> Å. L. J. S.

BURWELL (John T. II). *The unit cell and space group of monoclinic sulphur.* Zeits. Krist., 1937, vol. 97, pp. 123–124.

The space-group of  $\beta$ -sulphur is probably  $C_{2h}^5$ . The unit cell has  $a$  10.90,  $b$  10.96,  $c$  11.02 Å.,  $\beta$  83° 16'. H. H.

BOAS (W.). *Röntgenographische Untersuchung der Gitterstörungen in deformiertem Gold.* Zeits. Krist., 1935, vol. 96, pp. 214–224.

X-ray observations on gold powder obtained by filing gold wire showed a broadening of the lines and diminution of their intensity on account of elastic deformation. H. H.

BRADLEY (A. J.) & LU (S. S.). *The crystal structures of  $Cr_2Al$  and  $Cr_5Al_3$ .* Zeits. Krist., 1937, vol. 96, pp. 20–37, 10 figs.

The authors found eleven phases of chromium-aluminium alloy, and determined the structure of two. The space-group of  $Cr_2Al$  is  $D_{4h}^{17}$ ; the unit cell contains two molecules and has  $a$  2.9984,  $c$  8.6303 Å. The space-group of  $Cr_5Al_3$  is  $C_{3v}^5$ ; the rhombohedral unit cell contains two molecules and has  $a$  9.0327 Å.,  $\alpha$  89° 16.4'. The structure is very similar to that of  $Cu_5Zn_8$ . H. H.

NÁRAY-SZABÓ (St. v.). *Die Struktur des Zirkoniumsilicids  $ZrSi_2$ .* Zeits. Krist., 1937, vol. 97, pp. 223–228, 1 fig.

The space-group of zirconium silicide is  $D_{2h}^{17}$ . The unit cell contains four molecules of  $ZrSi_2$  and has  $a$  3.72,  $b$  14.61,  $c$  3.67 Å. H. H.

WEST (C. D.). *The structure of silver azide  $AgN_3$ .* Zeits. Krist., 1937, vol. 95, pp. 421–425, 1 fig.

The space-group of  $AgN_3$  is  $V_h^{26}$ . The unit cell contains four molecules and has  $a$  5.89,  $b$  5.58,  $c$  5.96 Å. The result is in tolerable agreement with that obtained by M. Bassière (1935). H. H.

BANNISTER (F. A.). *The discovery of braggite.* Zeits. Krist., 1937, vol. 97, pp. 201–202.

The concentrates from platiniferous norites of the Transvaal were separated by X-ray observation into two groups after sperrylite and

white crystals had been removed by hand-picking. One group consisted of cooperite with space-group  $D_{4h}^9$  and unit cell containing eight molecules of PtS with  $a$  4.91,  $c$  6.10 Å. The other proved to be a new mineral, named braggite, having space-group  $C_{4h}^2$  or  $C_4^3$  and a unit cell containing eight molecules of (Pt,Pd,Ni)S with  $a$  6.37,  $c$  6.58 Å. [Min. Mag., 23-188.]

H. H.

SKELL (T. F.). *The structure of braggite and palladium sulphide.* Zeits. Krist., 1937, vol. 96, pp. 203-213, 12 figs.

For the sake of comparison with the isomorphous braggite having composition (Pt,Pd,Ni)S the structure of palladium sulphide was determined. It has the space-group  $C_{4h}^2$  and its unit cell contains eight molecules of PdS with  $a$  6.43,  $c$  6.63 Å.

H. H.

GGINS (Maurice L.). *The crystal structures of marcasite, arsenopyrite, and loellingite.* Zeits. Krist., 1937, vol. 96, pp. 384-385.

A criticism of M. J. Buerger's work [M.A. 5-175, 523; 6-409] on the structure of FeS<sub>2</sub>, FeAsS, and FeAs<sub>2</sub>.

H. H.

BERGER (M. J.). *Interatomic distances in marcasite and notes on the bonding in crystals of löllingite, arsenopyrite, and marcasite types.* Zeits. Krist., 1937, vol. 97, pp. 504-513, 3 figs.

As the author's parameters for marcasite and löllingite [M.A. 5-22, 5] had been criticized, he made a fresh determination of the parameters of marcasite with increased precision, but found that they agreed with those made previously. An explanation is given of the abnormal interatomic distances found in the marcasite structure.

H. H.

NELL (George) & KSANDA (C. J.). *The crystal structure of krennerite.* Journ. Washington Acad. Sci., 1936, vol. 26, pp. 507-509. Abstract: Amer. Min., 1937, vol. 22, p. 207.

Crystals from Cripple Creek, Colorado, gave a unit cell  $a$  16.51,  $b$  8.80,  $c$  4.45 Å., containing 8AuTe<sub>2</sub>; space-group  $C_{2v}^4$ .

L. J. S.

NELL (George) & KSANDA (C. J.). *The strange morphology of calaverite in relation to its internal properties.* Journ. Washington Acad. Sci., 1936, vol. 26, pp. 509-528.

Only one structural lattice is present [M.A. 6-170] and this is closely related to the simple crystal-forms [M.A. 5-205]. The complex forms are related to certain adventive diffraction spots in the X-ray spectra. The structure shows certain relations to that of krennerite, but the

two minerals are distinct. Microscopical examination of polished surfaces shows no evidence of twinning [M.A. 6-192] or lack of homogeneity.

L. J. S.

TUNELL (G.) & KSANDA (C. J.). *The space-group and unit cell of sylvanite*. Amer. Min., 1937, vol. 22, pp. 728-730, 1 fig.

Crystals of sylvanite from Cripple Creek, Colorado, and from New York, Transylvania, gave  $a$  8.94,  $b$  4.48,  $c$  14.59 Å.,  $\beta$   $34^\circ 34'$  ( $a:b:c = 1.9955:1:3.2567$  in the new orientation) with two molecules  $\text{AuAg}_2\text{S}_3$  in the unit cell and space-group  $C_{2h}^4$ .

L. J. S.

MILLER (W. S.) & KING (A. J.). *The structure of polysulfides: I. Barium trisulfide*. Zeits. Krist., 1936, vol. 94, pp. 439-446, 4 figs.

$\text{BaS}_3$  is orthorhombic with  $a$  8.32,  $b$  9.64,  $c$  4.82 Å. ( $a:b:c = 0.86:1:0.5$ ). The unit cell contains four molecules, and the space-group is  $V^3$ .

L. J. S.

BUERGER (M. J.). *The unit cell and space group of cubanite*. Amer. Min., 1937, vol. 22, pp. 1117-1120.

Cubanite from Frood mine, Sudbury, Ontario, previously examined [M.A. 6-530] gave a unit cell,  $a$  6.43,  $b$  11.04,  $c$  6.19 Å., containing  $4\text{CuFe}_2\text{S}_3$ ; space-group  $C_{2v}^9$  or  $D_{2h}^{16}$ .

L. J. S.

LUNDQVIST (Dick) & WESTGREN (A.). *On the crystal structure of bornite*.  $\text{Cu}_5\text{FeS}_4$ . Arkiv Kemi, Min. Geol., 1937, vol. 12 B, no. 23, 6 pp., 1 fig.

$\text{Cu}_5\text{FeS}_4$ , produced by fusing Cu, Fe, and S in these proportions, gave the X-ray pattern of bornite, face-centred cubic with  $a$  10.93 Å. and eight molecules in the unit cell.

L. J. S.

BUERGER (Newton W.). *The unit cell and space group of sternbergite*.  $\text{AgFe}_2\text{S}_3$ . Amer. Min., 1937, vol. 22, pp. 847-852, 5 figs.

Crystals of sternbergite from Jáchymov, Bohemia, previously measured goniometrically [M.A. 6-530], gave  $a$  6.61,  $b$  11.64,  $c$  12.67 Å. ( $a:b:c = 0.568:1:1.088$ ; with  $\frac{1}{3}$  the old  $b$  and  $a$  and  $b$  interchanged). The unit cell contains  $8\text{AgFe}_2\text{S}_3$ ; space-group  $D_{2h}^{17}$ .

L. J. S.

HOCART (Raymond). *Schéma structural de la proustite et de la pyrrhotite*. Compt. Rend. Acad. Sci. Paris, 1937, vol. 205, pp. 68-70.

Both minerals are rhombohedral with  $a$  6.88 Å. (proustite) and 7.0 Å. (pyrrhotite), and 2 molecules of  $\text{Ag}_3\text{AsS}_3$  and  $\text{Ag}_3\text{SbS}_3$  respectively.

unit cell; space-group  $C_{3v}^6$  ( $R3c$ ). In both each Ag is surrounded octahedrally by 4S at an average distance 2.68 Å., while the groups  $AsS_3$  and  $SbS_3$  somewhat resemble  $CO_3$  in calcite. C. A. S.

DQVIST (DICK) & WESTGREN (A.). *The crystal structure of  $Cu_3VS_4$* . Svensk Kemisk Tidskrift, 1933, vol. 48, pp. 241–243, 1 fig.

Sulvanite, prepared by fusing vanadium sulphide, Cu, and S in a sealed tube, gave  $a$  5.379 and space-group  $T_d^1$ , in agreement with the results of Pauling and Hultgren [M.A. 5–310] and not with those of de Meijere [M.A. 4–27]. The S atoms are rather nearer to V than to Cu, suggesting a copper sulphovanadate. L. J. S.

LEVINSON (V. A.). *Electron diffraction patterns obtained from thin crystalline films*. Physikal. Zeits. Sowjetunion, Charkow, 1936, vol. 10, 484–494, 4 pls., 16 text-figs.

Electron diffraction patterns of sodium chloride films show that the plate cubes lie with one face in the film, but that there is lack of rotation in other directions. The crystal sizes perpendicular and parallel to the film are 35 and 210 Å. respectively. F. A. B.

LA (F.) & NOWOTNY (H.). *Anomale Röntgenogramme des Flußspats*. Zeits. Krist., 1936, vol. 95, p. 470.

Accurate measurements of the edge  $a$  of the unit cell of fluor spar gave 5.466 Å. Anomalous lines are visible in the X-ray photograph of fluor spar similar to those observed in rock-salt and cristobalite. H. H.

BER (W.). *Zur Kenntnis der Alkaliferrihexafluoride*. Zeits. Krist., 1937, vol. 96, pp. 15–19.

The salts  $R_3FeF_6$  with  $R = NH_4, Li, Na, K, Rb, Cs$ , form cubic crystals whose unit cells contain four molecules and have respectively  $a$  values of 1.89, 2.05, 2.00, 2.20, 2.6, 3.3 Å. The structures are similar in the exception of  $NH_4FeF_6$ , whose space-group is  $T^2$  or  $T_h^2$ . H. H.

USEN (Hans). *Pulver- und Drehphotogramme von Chiolith*. Zeits. Krist., 1936, vol. 95, pp. 394–403.

Chiolite has one of the space-groups  $D_{2d}^1, D_{2d}^3, C_{4v}^1$ , or  $D_{4h}^1$ . The unit cell contains two molecules of  $Na_5Al_3F_{14}$  and has  $a$  7.005,  $c$  10.39 Å. H. H.

GOLDSZTAUB (Stanislas). *Structure cristalline de la laurionite*. Com Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 702-703.

Laurionite is orthorhombic with  $a$  7.1,  $b$  9.7,  $c$  4.05 Å., and 4 molecules  $\text{PbOHCl}$  in the unit cell; space-group  $V_{16}^{16}_h$  ( $Pnam$ ). The structure closely resembles that of matlockite,  $\text{PbFCl}$ , the OH taking the place of the F. [Min. Mag. 23-587.] C. A. S.

NÁRAY-SZABÓ (St. v.) & SASVÁRI (K.). *Die Raumgruppe des Bariumchlorid-Dihydrats  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$* . Zeits. Krist., 1937, vol. 97, 235-237.

Barium chloride has the space-group  $C_{2h}^5$ . The unit cell contains four molecules of  $\text{BaCl}_2 \cdot 2\text{H}_2\text{O}$  and has  $a$  6.69,  $b$  10.86,  $c$  7.15 Å. H. H.

WEST (C. D.). *Sulfur-iodide crystals  $\text{RJ}_3 \cdot 3\text{S}_8$ : structure unit and optical properties*. Zeits. Krist., 1937, vol. 96, pp. 459-465.

$\text{CHI}_3 \cdot 3\text{S}_8$  and  $\text{AsI}_3 \cdot 3\text{S}_8$  have the space-group  $D_{3d}$ . Their rhombohedral unit cells containing one molecule have  $\alpha$   $118^\circ 55'$  and edges of length 14.165 and 14.281 Å. respectively. The refractive indices of  $\text{S}_8$ ,  $\text{AsI}_3$  and  $\text{CHI}_3$  were measured and compared with those of  $\text{CHI}_3 \cdot 3\text{S}_8$  and  $\text{AsI}_3 \cdot 3\text{S}_8$ . H. H.

FEITKNECHT (W.) & GERBER (W.). *Die Struktur der basischen Cadmiumchloride*. Zeits. Krist., 1937, vol. 98, pp. 168-179, 4 figs.

Cadmium chloride and its basic modifications have a hexagonal structure of which  $a'$  and  $c'$  in Å. are as follows:  $-\text{CdCl}_2$  4.26 and 5.47,  $\text{CdClOH}$  3.66 and 5.13,  $\text{CdCl}_{0.75}(\text{OH})_{1.25}$  3.58 and 5.47,  $\text{CdCl}_{0.68}(\text{OH})_{1.32}$  to  $\text{CdCl}_{0.56}(\text{OH})_{1.44}$  3.58 and 5.54,  $\text{CdCl}_{0.4}(\text{OH})_{1.6}$  3.58 and 5.00,  $\text{CdCl}_{0.3}(\text{OH})_{1.7}$  3.53 and 5.03,  $\text{Cd}(\text{OH})_2$  3.49 and 4.69. H. H.

BRASSEUR (H.) & RASSENFOSSE (A. de). *Sur la structure du groupement  $\text{CdCl}_4^{2-}$* . Zeits. Krist., 1936, vol. 95, pp. 474-475.

The crystallographic axial ratios of  $\text{BaCdCl}_4 \cdot 4\text{H}_2\text{O}$  are  $a:b:c$  0.8592:1:0.5131,  $\alpha = 92^\circ 35'$ ,  $\beta = 106^\circ 18'$ ,  $\gamma = 88^\circ 26'$ , suggesting morphotropy with  $\text{BaPt}(\text{CN})_4 \cdot 4\text{H}_2\text{O}$ ,  $\text{BaPd}(\text{CN})_4 \cdot 4\text{H}_2\text{O}$ , and  $\text{BaNi}(\text{CN})_4 \cdot 4\text{H}_2\text{O}$ . The measurements  $a$  11.45,  $b$  13.34,  $c$  6.88 Å., of the unit cell are in agreement with this hypothesis. H. H.

BRASSEUR (H.) & RASSENFOSSE (A. de). *Étude cristallographique de la nickelocyanure de potassium à trois molécules d'eau*. Zeits. Krist., 1937, vol. 97, pp. 239-240.

The salt is triclinic and pseudohexagonal with crystallographic constants  $a:b:c = 1.700:1:0.832$ ,  $A = 84^\circ 32'$ ,  $B = 87^\circ 33'$ ,  $C = 90^\circ$ .

unit cell has dimensions  $a$  15.02,  $b$  8.89,  $c$  7.32 Å. It is isomorphic with the corresponding sodium salt. The principal refractive indices for different wave-lengths were determined. H. H.

NEKOV (SHISHACOW) (N. A.). *Anomalous structures of fine crystalline silica*. Compt. Rend. (Doklady) Acad. Sci. URSS, 1936, vol. 1 (10), pp. 19-22.

By means of the electron diffraction method it was proved that fused silica is not an amorphous substance but consists of deformed cristobalite crystals ( $a$  6.87,  $c$  7.28,  $c/a$  1.06). Pumice also gave a similar pattern ( $a$  6.82,  $c$  7.23,  $c/a$  1.06). S. I. T.

UWENKAMP (W.). *Über die Struktur von Hoch-Cristobalit*. Zeits. Krist., 1937, vol. 96, pp. 454-458, 3 figs.

The space-group of high-temperature cristobalite is  $O_h^1$ . The unit cell contains eight molecules of  $\text{SiO}_2$  and has an edge 7.11 Å. H. H.

HEMANN (Barbara). *Röntgenuntersuchungen an Manganoxyd*. Physik. Zeits. Sowjetunion, Charkow, special no. (Arbeiten auf dem Gebiete tiefer Temperaturen), June, 1936, pp. 91-106, 7 figs.

The lattice constant of  $\text{MnO}$  ranges from  $a$  4.4345 Å. at 17° C. to 3.60 Å. at -178° C. At lower temperatures there is a rather smaller cell which is not strictly cubic. L. J. S.

MULLOUGH (James D.). *The crystal structure of selenium dioxide*. Journ. Amer. Chem. Soc., 1937, vol. 59, pp. 789-794, 5 figs.

Sublimed  $\text{SeO}_2$  is tetragonal with a unit cell,  $a$  8.353,  $c$  5.051 Å. containing 8  $\text{SeO}_2$ ; space-group  $D_{4h}^{13}$ . The structure consists of chains of alternating Se and O atoms along the  $c$ -axis, with O of a second kind attached to each Se. L. J. S.

BERGER (M. J.) & HENDRICKS (S. B.). *Polymorphism of antimony trioxide and the structure of the orthorhombic form*. Journ. Chem. Physics (Amer. Inst. Physics), 1937, vol. 5, p. 600.

— — — *The crystal structure of valentinite (orthorhombic  $\text{Sb}_2\text{O}_3$ )*. Zeits. Krist., 1937, vol. 98, pp. 1-30, 11 figs.

Valentinite from Su Suergiu, Sardinia, has the space-group  $D_{2h}^{10}$ . The unit cell contains four molecules of  $\text{Sb}_2\text{O}_3$  and has  $a$  4.92,  $b$  12.46,  $c$  5.42 Å. The arrangement of the atoms is 8Sb in 8e with  $x$  0.044,  $y$  0.128,  $z$  0.179; 8O in 4c with  $u$  0.029; 8O in 8e with  $x$  0.147,  $y$  0.058,  $z$  -0.139. H. H.

DIHLSTRÖM (K.) & WESTGREN (A.). *Über den Bau des sogenannten Antimontetroxyds und der damit isomorphen Verbindung  $\text{BiTa}_2\text{O}_7$* . Zeits. Anorg. Chem., 1937, vol. 235, pp. 153–160.

The powder obtained by heating antimonie acid has the composition  $\text{Sb}'''\text{O} \cdot \text{OH} \cdot \text{Sb}_2\text{O}_5$  (not  $\text{Sb}_2\text{O}_4$ , M.A. 3–429, 5–294). The face-centred cubic cell of edge  $10.28 \text{ \AA}$ . contains  $8\text{Sb}_3\text{O}_6\text{OH}$ ; space-group  $O_h^7$ . It is isomorphous with  $\text{BiTa}_2\text{O}_7\text{F}$  with  $a \ 10.46 \text{ \AA}$ . L. J. S.

HÄGG (Gunnar). *Die Kristallstruktur des magnetischen Ferrioxyds  $\gamma\text{-Fe}_2\text{O}_3$* . Zeits. Physikal. Chem., Abt. B, 1935, vol. 29, pp. 95–122, 2 figs.

The oxidation of  $\text{Fe}_3\text{O}_4$ , leading through a series of mixed crystals  $\gamma\text{-Fe}_2\text{O}_3$ , is accompanied by an almost linear reduction of the cell-symmetry from  $8.380$  to  $8.322 \text{ \AA}$ . The change of specific gravity shows that the mixed crystals and  $\gamma\text{-Fe}_2\text{O}_3$  differ from  $\text{Fe}_3\text{O}_4$  by having vacant positions. The X-ray powder photographs show that the vacant positions may be statistically distributed either over all the Fe positions or over the 16-fold positions only. The oxidation process must involve a lattice breakdown and reconstitution [a migration of the Fe atoms to the crystal surface would be equally effective]. The supposed dissociation of  $\gamma\text{-Fe}_2\text{O}_3$  in vacuo at  $250^\circ \text{C}$ . is really a reduction by Hg vapour or organic vapours. [Cf. M.A. 5–177, 178]. M. H. H.

BEEVERS (C. A.) & BROHULT (S.). *The formula of "β alumina",  $\text{Na}_2\text{O} \cdot 11\text{Al}_2\text{O}_3$* . Zeits. Krist., 1936, vol. 95, pp. 472–474.

Sodium β-alumina and potassium β-alumina have the composition  $\text{Na}_2\text{Al}_{22}\text{O}_{34}$  and  $\text{K}_2\text{Al}_{22}\text{O}_{34}$ . Their hexagonal unit cells have  $a \ 5.584$ ,  $c \ 22.45 \text{ \AA}$ . and  $5.584$ ,  $22.67 \text{ \AA}$ . respectively. H. H.

BEEVERS (C. A.) & ROSS (M. A. S.). *The crystal structure of "beta alumina",  $\text{Na}_2\text{O} \cdot 11\text{Al}_2\text{O}_3$* . Zeits. Krist., 1937, vol. 97, pp. 59–66, 2 figs.

The space-group of β-alumina (really  $\text{Na}_2\text{O} \cdot 11\text{Al}_2\text{O}_3$ ) is  $D_{6h}^4$ . The unit cell has  $a \ 5.584$ ,  $c \ 22.45 \text{ \AA}$ .; and the unit cell of the isomorphous  $\text{K}_2\text{Al}_{22}\text{O}_{34}$  has  $a \ 5.584$ ,  $c \ 22.67 \text{ \AA}$ . and contains one molecule. H. H.

BÜSSEM (W.) & GALLITELLI (P.). *Zur Struktur des Calciumsulphat-Halbhydrats  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$* . Zeits. Krist., 1937, vol. 96, pp. 376–381, 1 fig.

A criticism of work done by W. A. Caspari [M.A. 6–351] on the structure of  $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ . [Cf. M.A. 5–314, 451; 6–58.] H. H.

R (E.). *Über die Gitterkonstante von Alaunen mit schwerem und leichtem Kristallwasser*. Zeits. Krist., 1937, vol. 97, pp. 523-525.

X-ray determinations of the structure of potassium chromium alum and potassium aluminium alum gave the same result, within the limits of experimental error, whether the twelve molecules of water of crystallization consisted of light or of heavy water. H. H.

ANDRICKS (Sterling B.). *The crystal structure of alunite and the jarosites*. Amer. Min., 1937, vol. 22, pp. 773-784, 2 figs.

Alunite and jarosite are strongly pyroelectric, and the space-group is therefore  $C_{3v}$ . The unit rhombohedral cell contains  $R'R''_3(SO_4)_2(OH)_6$ . The compound  $3Fe_2O_3 \cdot 4SO_3 \cdot 9H_2O$  may be written as  $H_2O \cdot Fe_3(SO_4)_2 \cdot 5H_2O$  to show a relation to jarosite. Carphosiderite, borgströmite [A 2-10], and hamlinite show similar patterns in powder photographs, and the several other minerals (sulphato-phosphates and phosphates) in this group no doubt have the same structure. This structure is characterized by binding between OH and  $SO_4$  groups.

|                                   |     | a.   | c.       | c/a<br>(X-ray). | c/a<br>(goniom). | Density<br>calc. | obs. |
|-----------------------------------|-----|------|----------|-----------------|------------------|------------------|------|
| Alunite                           | ... | 6.96 | 17.35 Å. | 2.492           | 1.252            | 2.80             | 2.75 |
| Jarosite                          | ... | 7.20 | 17.00    | 2.361           | 1.245            | 3.24             | 3.26 |
| Pentajarosite                     | ... | 7.22 | 16.40    | 2.27            | 1.106            | 3.80             | —    |
| Hexajarosite                      | ... | 7.18 | 16.30    | 2.27            | 1.104            | 3.29             | 3.2  |
| Heptajarosite                     | ... | 7.20 | 17.00    | 2.36            | —                | 3.09             | —    |
| Octajarosite                      | ... | 7.20 | 33.60    | 4.67            | 1.147            | 3.71             | 3.67 |
| $Fe_2O_3 \cdot 4SO_3 \cdot 9H_2O$ | ... | 7.16 | 16.90    | 2.36            | 1.140            | —                | —    |

L. J. S.

AUS (O.). *Untersuchungen über das Kristallgitter von Heteropolysäuren und deren Salzen. 4. Mitteilung. Molekülgröße und Kristallgitter des triklinen Eisensilikowolframats,  $FeH(SiW_{12}O_{40}) \cdot 20H_2O$* . Zeits. Krist., 1937, vol. 96, pp. 330-335. [Cf. M.A. 6-334-5, 413.]

Iron silicotungstate has the space-group  $C_i$ . The unit cell contains  $n$  molecules of  $FeHSiW_{12}O_{40} \cdot 20H_2O$  and has  $a$  19.11,  $b$  22.50,  $c$  19.92 Å.,  $\alpha$  87° 55',  $\beta$  105° 37',  $\gamma$  92° 25'. The rhombohedral unit cell contains  $n$  molecules of  $FeHSiW_{12}O_{40} \cdot nH_2O$ , where  $n = 24, 28$ , or  $30$ , contains two molecules; has  $a$  15.96 Å. and  $\alpha$  58° 32',  $a$  16.46 Å. and  $\alpha$  56° 30',  $a$  16.33 Å. and  $\alpha$  60°, respectively. The corresponding space-groups are  $D_{3d}^5$ ,  $D_{3d}^5$ ,  $D_{3d}^5$ . H. H.

SNER (B.) [1877-1937]. *Über Sulfate und Phosphate mit ähnlichem Kristallgitter*. Zeits. Krist., 1937, vol. 96, pp. 488-492.

Gypsum and pharmacolite have unit cells containing respectively

eight molecules of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  and  $\text{Ca}[\text{AsO}_3(\text{OH})] \cdot 2\text{H}_2\text{O}$ . They have respectively  $a$  10.47,  $b$  15.15,  $c$  6.28 Å.,  $\beta$  81° 2' and  $a$  10.97,  $b$  15.15,  $c$  6.29 Å.,  $\beta$  83° 24'. Alunite has space-group  $D_{3d}^5$  and a rhombohedral unit cell containing one molecule of  $[\text{S}_2\text{O}_8](\text{AlO}_2\text{H}_2)_3\text{K}$  with  $a$  7.05,  $\alpha$  59° 2'. Hamlinite has space-group  $C_{3v}^5$  and a rhombohedral unit cell containing one molecule of  $[\text{P}_2\text{O}_7(\text{OH})](\text{AlO}_2\text{H}_2)_3\text{Sr}$  with  $a$  6.82,  $\alpha$  61° 28'. There is an obvious resemblance between gypsum and pharmacolite and between alunite and hamlinite. H. F.

GRUNER (J. W.) & McCONNELL (Duncan). *The problem of the carbon in apatites. The structure of francolite.* Zeits. Krist., 1937, vol. 60, pp. 208–215, 1 fig.

The authors discuss the modifications which must be made in the theoretical structure of fluor-apatite in order that it may represent the structure of apatites containing  $\text{CO}_3$  groups. H. F.

McCONNELL (Duncan). *A structural investigation of the isomorphism in the apatite group.* Amer. Min., 1938, vol. 23, pp. 1–19, 2 figs. M.A. 7–14.]

In the apatite structure [M.A. 4–462] it is suggested that calcium may be replaced by Na, K, Mn, Sr, Mg, C; phosphorus by S, Si, V, C; oxygen by F and OH; fluorine by Cl, O, OH, but not by CO<sub>3</sub> groups; carbon replacing both Ca and P. X-ray data are given for several apatite-like minerals and the following formulae are suggested but all the analyses are not reliable:

|  | $a$ . | $c$ . | S |
|--|-------|-------|---|
| Fluor-apatite, $(\text{Ca}_3\text{F})_2(\text{PO}_4)_6\text{Ca}_4$ ... ..                            | 9.36  | 6.88  | 3 |
| Dahllite, $\text{Ca}_6(\text{OH})_2(\text{P,C})_6\text{O}_{24}(\text{Ca,C})_4$ ... ..                | 9.41  | 6.88  | 2 |
| Dehrnite, $(\text{Ca,Na})_6(\text{OH})_2(\text{PO}_4)_6(\text{Ca,C})_4$ ... ..                       | 9.31  | 6.87  | 3 |
| Lewistonite, $(\text{Ca,K,Na})_6(\text{OH})_2(\text{PO}_4)_6(\text{Ca,C})_4$ ... ..                  | 9.35  | 6.89  | 3 |
| Francolite, $(\text{Ca}_3\text{F})_2(\text{P,C})_6(\text{O,OH,F})_{24}(\text{Ca,C})_4$ ... ..        | 9.34  | 6.88  | 3 |
| Hydroxy-apatite, $(\text{Ca}_3\text{OH})_2(\text{PO}_4)_6\text{Ca}_4$ ... ..                         | 9.42  | 6.94  | 3 |
| Wilkeite, $\text{Ca}_6(\text{Cl,F,OH,O})_2(\text{P,S,Si,C})_6\text{O}_{24}(\text{Ca,C})_4$ ... ..    | 9.48  | 6.91  | 3 |
| Fermorite, $(\text{Ca,Sr})_6(\text{F,OH,O})_2(\text{P,As})_6\text{O}_{24}\text{Ca}_4$ ... ..         | 9.60  | 7.00  | 3 |
| Mangan-apatite, $(\text{Ca,Mn})_6\text{F}_2(\text{PO}_4)_6\text{Ca}_4$ ... ..                        | 9.33  | 6.80  | 3 |
| Ellestadite, $\text{Ca}_6(\text{Cl,F,O,OH})_2(\text{S,Si,P,C})_6\text{O}_{24}(\text{Ca,C})_4$ ... .. | 9.53  | 6.91  | 3 |

L. J.

CAGLIOTI (Vincenzo). *Relazioni fra  $\text{AlPO}_4$  e  $\text{SiO}_2$  e fra gli acidi aluminofosforici e gli acidi silicici.* Atti V° Congresso Naz. Chimica, 1937, pt. 1, pp. 310–320, 3 figs.

Precipitated  $\text{AlPO}_4$  is amorphous, but when heated with fused Na<sub>2</sub>CO<sub>3</sub> forms pseudo-tetragonal (probably orthorhombic) crystals with  $a$  7.0.

4.45 Å. and a structure very similar to that of cristobalite. The unit cell contains 4 mols.; sp. gr. 2.31. Wavellite, with  $a$  9.7,  $b$  17.4,  $c$  7.07 Å., contains 4 mols. in the unit cell.

L. J. S.

WILLING (Linus) & SHERMAN (J.). *The crystal structure of aluminium metaphosphate*,  $Al(PO_3)_3$ . Zeits. Krist., 1937, vol. 96, pp. 481-487, 2 figs.

Aluminium metaphosphate has the space-group  $T_d^6$ . The unit cell contains sixteen molecules of  $Al(PO_3)_3$  with  $a$  13.63 Å. The positions of all atoms in the unit cell were determined.

H. H.

PERK (G. L.) & GROSS (S. T.). *Some of the higher hydrates of trisodium phosphate  $Na_3PO_4$  and trisodium vanadate  $Na_3VO_4$* . Zeits. Krist., 1937, vol. 98, pp. 107-111, 4 figs.

Trisodium phosphate dodecahydrate has the probable space-group  $C_{2h}$ . The unit cell contains twelve molecules of  $Na_3PO_4 \cdot 12H_2O$  with  $a$  12.02,  $c$  12.66 Å. Trisodium vanadate dodecahydrate has a similar structure with  $a$  12.16,  $c$  12.79 Å. The compound  $2Na_3VO_4 \cdot NaF \cdot 19H_2O$  has the space-group  $O_h^8$  and the unit cell has an edge of 28.27 Å.

H. H.

DE W. F. & LANGE (J. J. De). *X-ray study of pucherite*. Amer. Min., 1936, vol. 21, p. 809.

Crystals of pucherite from Schneeberg, Saxony, gave a unit cell with  $a$  10.38,  $b$  5.04,  $c$  11.98 Å. ( $a:b:c = 1.069:1:2.379$ ). Assuming this cell contains four molecules  $BiVO_4$ , the calculated density is 6.57.

L. J. S.

DE W. F. & LANGE (J. J. De). *On the crystallography of brushite*. Zeits. Krist., 1937, vol. 97, pp. 229-233, 5 figs.

Brushite is orientated so as to bring out its isomorphism with apatite. It has the crystallographic constants  $a:b:c = 0.6817:1:0.4156$ ,  $\alpha = 84^\circ 53'$ . It has the space-group  $C_{2h}^3$ . The unit cell has  $a$  10.3,  $b$  15.4,  $c$  4.4 Å.,  $\beta$   $84^\circ 53'$ . It is piezoelectric and has the composition  $CaHPO_4 \cdot 2H_2O$ .

H. H.

DE W. F. & LANGE (J. J. De). *Über die Gitterkonstanten und die Raumgruppe von Durangit*. Naturwiss., 1937, vol. 25, p. 717.

Crystals of durangite from Durango, Mexico, gave a unit cell,  $a$  6.53,  $b$  4.46,  $c$  7.00 Å.,  $\beta$   $65^\circ$ , containing 4 mols.  $NaAlF(AsO_4)$ ; space-group  $C_{2h}^6$ . Comparison is made with sphene.

L. J. S.

TAKANÉ (K.) & ÔMORI (K.). *Crystal structure of vivianite from As mine, Japan*. Journ. Jap. Assoc. Min. Petr. Econ. Geol., 1937, vol. 16, pp. 234-240, 263-276, 5 figs. (Japanese.)

The unit cell,  $a$  10.12,  $b$  13.45,  $c$  4.73 Å.,  $\beta$  75° 29', contains 2 molecules of  $\text{Fe}(\text{PO}_4)_2 \cdot 8\text{H}_2\text{O}$ . The perfect (010) and imperfect (100) cleavages successfully explained by the atomic arrangement.  $\text{H}_2\text{O}$  molecules occupy so essential parts of the lattice that the extraction of even one molecule would cause collapse of the cell. The space-group  $C_{2h}^3$  is confirmed. R. O.

KOKKOROS (P.). *Über die Struktur von Adaminit*. Zeits. Krist., 1937, vol. 96, pp. 417-434, 3 figs.

The space-group of adamite is  $V_h^{12}$ . The unit cell contains four molecules of  $\text{Zn}(\text{ZnOH})\text{AsO}_4$  and has  $a$  8.31,  $b$  8.51,  $c$  6.06 Å. H. H.

CLARK (G. L.) & REYNOLDS (D. A.). *The crystal structure of zinc meta-antimonate  $\text{Zn}(\text{SbO}_3)_2$* . Zeits. Krist., 1937, vol. 98, pp. 185-190, 2 figs.

The space-group of zinc meta-antimonate is probably  $D_{2d}^8$ . The unit cell contains two molecules of  $\text{Zn}(\text{SbO}_3)_2$  and has  $a$  6.585,  $c/a$  0.783. The substance is prepared by calcination at 850° C. of the theoretical quantities of zinc nitrate of antimony trioxide. It is a white powder of density 6.5. H. H.

ZACHARIASEN (W. H.). *The crystal structure of potassium acid dihydronium pentaborate  $\text{KH}_2(\text{H}_3\text{O})_2\text{B}_5\text{O}_{10}$* . (potassium pentaborate tetrahydrate). Zeits. Krist., 1937, vol. 98, pp. 266-274, 3 figs.

The space-group of potassium pentaborate tetrahydrate is  $C_{2v}^{17}$ . The unit cell contains four molecules of  $\text{KB}_5\text{O}_8 \cdot 4\text{H}_2\text{O}$  and has  $a$  11.08,  $b$  11.08,  $c$  8.97 Å. The atomic parameters were determined. They point to a structure represented by the formula  $\text{KH}_2(\text{H}_3\text{O})_2\text{B}_5\text{O}_{10}$ . H. H.

YÜ (S. H.). *Evidence of abnormal behaviour of  $\text{NO}_3$  in the cubic crystals of  $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{NH}_3$* . Nature, London, 1937, vol. 141, pp. 158-159, 2 figs.

A possible structure allows a large oscillation of the  $\text{NO}_3$  groups. Cooled in liquid air the crystals first contract and then expand, the colour changing from blue-violet to dark purple and then to pink. L. J. S.

ZIEGLER (G. E.). *The crystal structure of potassium nitrite,  $\text{KN}$* . Zeits. Krist., 1936, vol. 94, pp. 491, 2 figs.

$\text{KNO}_2$  has a unit cell,  $a$  4.45,  $b$  4.99,  $c$  7.31 Å.,  $\beta$  65° 10', containing two molecules; space-group  $C_s^3$ . L. J. S.

ELAAR (J. A. A.). *Die Kristallstruktur des Silbernitrits*. Zeits. Krist., 1936, vol. 95, pp. 383-393, 2 figs.

ver nitrite has the space-group  $C_{2v}^{20}$ . The unit cell contains two molecules of  $\text{AgNO}_2$  and has  $a$  3.50,  $b$  6.14,  $c$  5.16 Å. H. H.

NER (B.) [1877-1937]. *Über das Kristallgitter des Calciumjodates und seine Beziehungen zu jenem des Kaliumjodates*. Zeits. Krist., 1937, vol. 96, pp. 381-384.

om the cubic lattice of potassium iodate, whose cubic unit cell has edge Å., the structure  $\text{CaI}_2\text{O}_6$  is obtained theoretically and compared with observed structure having the space-group  $C_{2h}^5$  and unit cell with  $a$  7.18, 38,  $c$  7.32 Å.,  $\beta$  73° 38', containing four molecules of  $\text{CaI}_2\text{O}_6$ . H. H.

TEMA (J.). *Die Kristallstruktur der Alkaliperrhenate und -perjodate*. Zeits. Krist., 1937, vol. 97, pp. 300-322, 6 figs.

arium perrhenate crystallizes as rectangular plates belonging to monoclinic system. It has axial ratios  $a:b:c = 0.9778:1:0.5924$ , 90°. Its unit cell contains four molecules of  $\text{Ba}(\text{ReO}_4)_2$  and has 19,  $b$  12.44,  $c$  7.33 Å.  $\text{NaReO}_4$ ,  $\text{NH}_4\text{ReO}_4$ ,  $\text{RbReO}_4$ ,  $\text{TlReO}_4$  (above C.),  $\text{NH}_4\text{IO}_4$ ,  $\text{RbIO}_4$  have the scheelite structure with space-group . The unit cell contains four molecules and has for  $a$  and  $c$  5.362 11.718, 5.871 and 12.942, 5.803 and 13.167, 5.761 and 13.33, 5.983 12.790, 5.874 and 12.938 Å. respectively.  $\text{CsReO}_4$ ,  $\text{TlReO}_4$  (below C.),  $\text{CsIO}_4$  have the space-group  $D_{2h}^{16}$  and a structure allied to but identical with that of scheelite. The unit cell contains four molecules and has for  $a$ ,  $b$ , and  $c$  5.737, 5.968, and 14.241; 5.623, 5.791, and 95; 5.838, 6.014, and 14.364 Å. respectively. H. H.

(S. H.) & BEEVERS (C. A.). *The crystal structure of zinc bromate hexahydrate* [ $\text{Zn}(\text{BrO}_3)_2 \cdot 6\text{H}_2\text{O}$ ]. Zeits. Krist., 1936, vol. 95, pp. 426-434, 5 figs.

the space-group of  $\text{Zn}(\text{BrO}_3)_2 \cdot 6\text{H}_2\text{O}$  is  $T_h^6$  and the edge of the unit containing four molecules is 10.316 Å. Taking the zinc atoms at  $(0, \frac{1}{2}, \frac{1}{2})$ ,  $(\frac{1}{2}, 0, \frac{1}{2})$ ,  $(\frac{1}{2}, \frac{1}{2}, 0)$  the parameters of Br are 0.259, 0.259, 0.259,  $\text{H}_2\text{O}$  0.195, 0.050, 0.965, of O 0.190, 0.145, 0.330. H. H.

RIS (J. E.), FRONDEL (Clifford), GÜSSOW (W. C.), LOPEZ (V. M.), LORD (C. S.), PARRISH (William), & SHIMER (J. A.). *Atomic packing models of some common silicate structures*. Amer. Min., 1938, vol. 23, pp. 65-84, 16 figs.

ustrations of models of the crystal-structure of zircon, olivine,

diopside, muscovite, and sanidine, constructed according to the method of M. J. Buerger [M.A. 6-450]. L. J. S.

ITO (T.) & INUZUKA (H.). *A microphotometric study of X-ray powder diagrams of certain feldspars*. Zeits. Krist., 1936, vol. 95, pp. 404-411 figs.

Eleven microphotometer records are shown of powder photographs of orthoclase, moonstone, andesine, microperthite, perthite, and various mixtures of orthoclase and albite. H. F.

PABST (Adolf). *The crystal structure of plazolite*. Amer. Min., 1937, vol. 22, 861-868, 1 fig.

Plazolite from Crestmore, California [M.A. 1-151, 254], has a structure similar to that of grossular with  $a$  12.14 Å. and eight molecules of  $3\text{CaO} \cdot \text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$  in the unit cell; space-group  $O_h^{10}$ . Grossular from Georgetown, California [M.A. 6-533] gave  $a$  11.85 Å., sp. gr. 3.6. L. J. S.

STRUNZ (H.). *Über Kristallographie und chemische Zusammensetzung von Lawsonit und Lievrit*. Zeits. Krist., 1937, vol. 96, pp. 504-506.

Lawsonite  $[\text{Si}_2\text{Al}_2\text{O}_8]\text{Ca} \cdot 2\text{H}_2\text{O}$  and ilvaite  $[\text{Si}_2\text{Fe}_2\text{O}_8]\text{Ca} \cdot \text{Fe}_2\text{OH}$  have axial ratios given respectively by  $a:b:c = 0.669:1:0.444$ , and  $a:b:c = 0.675:1:0.448$ , while their unit cells have respectively  $a$  8.85,  $b$  13.07,  $c$  5.87 Å., and  $a$  8.82,  $b$  13.07,  $c$  5.86 Å. Hence in spite of the marked difference in their chemical formulae they are closely related structurally and crystallographically. H. F.

STRUNZ (Hugo). *Titanit und Tilasit. Über die Verwandtschaft der Titanate mit den Phosphaten und Arsenaten*. Zeits. Krist., 1937, vol. 96, pp. 7-14, 1 fig.

Sphene and tilasite have the space-group  $C_{2h}^6$  (perhaps  $C_s^4$ ). Their unit cells contain four molecules of  $[\text{SiO}_4]\text{O}[\text{TiCa}]$  or  $[\text{AsO}_4]\text{F}[\text{MgCa}]$  and have  $a$  6.55,  $b$  8.70,  $c$  7.43 Å., and  $a$  6.66,  $b$  8.95,  $c$  7.56 Å., respectively. The similarity of their structures points to their being isotypic in spite of the difference in their chemical composition. A list of similar isotypes between other silicates and phosphates (or arsenates) is given. H. F.

BUERGER (M. J.) & PARRISH (William). *The unit cell and space group of tourmaline (an example of the inspective equi-inclination treatment of trigonal crystals)*. Amer. Min., 1937, vol. 22, pp. 1139-1150, 7 figs.

Tourmaline from Etta mine, South Dakota, with  $\omega$  1.658,  $\epsilon$  1.61, [density not determined and colour not stated], showed by the e

ination Weissenberg X-ray method [M.A. 6-165, 450, 452] a rhombic rather than a hexagonal [M.A. 2-15, 4-204] lattice of space-group  $C_{3v}^5$ , with rhombohedral unit cell  $a$  9.500 Å.,  $\alpha$  66° 5' (or hexagonal  $a$  15.928,  $c$  7.151 Å.,  $c/a$  0.4490).  
L. J. S.

SCHUS (Ernst), HOFMANN (Urich), & LESCHEWSKI (Kurt). *Röntgenographische Strukturuntersuchung von Ultramarinblau und seinen Reaktionsprodukten*. Zeits. Anorg. Chem., 1936, vol. 228, pp. 305-333, 9 figs.

The space-group of ultramarine is  $T_d^4$ . A structure is found similar in general outline to that proposed by F. M. Jaeger [M.A. 4-463], but different in detail. Definite lattice positions are found for all the constituents, but there is evidence that the exchangeable ions (alkali and thorium) have a particularly large amplitude of thermal vibration. A variety of reaction products of ultramarine were also examined, including sodium and lithium ultramarines and an oxidized 'sulphate ultramarine'. Ultramarine has a lower symmetry, probably  $T^1$ ; its relation to nosean is discussed.  
M. H. H.

TURNER (John W.). *Composition and structure of stilpnomelane*. Amer. Min., 1937, vol. 22, pp. 912-925, 2 figs.

Stilpnomelane, black with bright lustre and light greenish-brown streak, from Baern (Beroun), Moravia, has  $\alpha$  1.58,  $\gamma$  1.677, 2V very small, sp. gr. 2.89, and gave on analysis by S. Goldich  $\text{SiO}_2$  44.77,  $\text{TiO}_2$  1.4,  $\text{Al}_2\text{O}_3$  6.32,  $\text{Fe}_2\text{O}_3$  20.79,  $\text{FeO}$  12.83,  $\text{MnO}$  0.21,  $\text{MgO}$  4.01,  $\text{CaO}$  0.10,  $\text{K}_2\text{O}$  0.07,  $\text{K}_2\text{O}$  3.31,  $\text{H}_2\text{O} +$  5.64,  $\text{H}_2\text{O} -$  1.96 = 100.05. Water is given off gradually up to 500° C. (5½%), then a quicker loss, and at 560° the structure collapses. Formula  $(\text{OH})_{16}(\text{K}, \text{Na}, \text{Ca})_3(\text{Fe}, \text{Mg}, \text{Al})_{25-2}(\text{Si}, \text{Al})_{32}\text{O}_{89}$ .  $\text{H}_2\text{O}$ , one-quarter of which is accommodated in the pseudo-hexagonal monoclinic cell  $a$  5.25,  $b$  9.10,  $d_{001}$  12.12 Å. A structure with pyrophyllite layers is suggested. At 300° C. in 0.1 N HCl the structure is changed to that of pyrophyllite. Base-exchange products with Tl and Mg were obtained.  
L. J. S.

TURNER (J. W.). *Notes on the structure of serpentines*. Amer. Min., 1937, vol. 22, pp. 97-103.

The X-ray powder photographs indicate two kinds of serpentine—pyrophyllite (including picrolite and 'precious serpentine') and chrysotile, the former giving more and sharper lines. In the different varieties  $a$  14.40-14.52,  $b$  18.50-18.74,  $c$  5.28-5.36 Å.,  $\beta$  87°. Chrysotile has a different structure, but some modification is required in that suggested by

Warren and Bragg (M.A. 4-466]. Antigorite is platy || (100) and may have a chain or sheet structure. [Cf. M.A. 6-476.] L. J. S.

BRUNOWSKY (B. [K.]). *Die Struktur des Katapleits* ( $\text{Na}_2\text{ZrSi}_3\text{O}_9 \cdot 2\text{H}_2\text{O}$ ). Acta Physicochemica U.S.S.R. 1936, vol. 5, pp. 863-892, 1 pl., 15 text-figs.

Structures based on the benitoite ring with space-groups  $C_{6v}^4$ ,  $D_{6h}^4$  and  $D_{6h}^4$  are suggested for catapleite [M.A. 6-180.] L. J. S.

FANKUCHEN (I.). *Crystal structure of sodium uranyl acetate*. Zeits. Krist., 1935, vol. 91, pp. 473-479, 3 figs.

Crystals of sodium uranyl acetate ( $d$  2.562) were studied by X-ray powder and oscillation photographs. The unit cell containing  $4\text{NaU}(\text{C}_2\text{H}_3\text{O}_2)_3$  has cell edge  $10.670 \pm 0.001 \text{ \AA}$ ., calculated specific gravity 2.554, and space-group  $T^4 = P2_13$ . A probable crystal-structure in which the uranium atoms are accurately, and the acetate groups approximately, located, is given. F. A. B.

KLASENS (H. A.), PERDOK (W. G.), & TERPSTRA (P.). *Crystallography of strontium oxalate*. Zeits. Krist., 1937, vol. 96, pp. 227-230, 4 figs.

Strontium oxalate forms tetragonal crystals with crystallographic ratio  $a:c = 1:0.580$ . The specific gravity is 2.384, the principal refractive indices  $\omega$  and  $\epsilon$  are 1.517 and 1.535, and the chemical formula is  $\text{SrC}_2\text{O}_4 \cdot 2\frac{1}{2} \text{ aq.}$  Its space-group is  $C_{4h}^5$ , and the unit cell has  $a$  12.6,  $b$  7.44, containing eight molecules. Calcium oxalate also has a tetragonal unit cell for which  $a$  12.375,  $c$  7.377  $\text{\AA}$ .; its chemical formula is  $\text{CaC}_2\text{O}_4 \cdot 3 \text{ aq.}$  H. H.

### Clays.

BRAGG (Sir William). *Clay*. Proc. Roy. Inst. Great Britain, 1938, vol. 30, pp. 39-67, 2 pls., 8 text-figs.

An exposition of the crystal-structure of clay minerals as layers of  $\text{H}_2\text{Si}_2\text{O}_5$ ,  $\text{Al}(\text{OH})_3$ ,  $\text{Mg}(\text{OH})_2$ , and  $\text{H}_2\text{O}$ , and the relation of this structure to the physical properties. L. J. S.

NAGELSCHMIDT (G.). *X-ray investigations on clays. Part III. The differentiation of micas by X-ray powder photographs*. Zeits. Krist., 1937, vol. 97, pp. 514-521. [Cf. M.A. 6-136.]

Powder photographs of the micas muscovite (two varieties), hydromuscovite, lepidolite, phlogopite, biotite, lepidomelane, and zinnwaldite were taken and found to belong to two well-marked types.

covite and phlogopite-biotite. The application of the work to soil analysis is considered.  
H. H.

SMALL (A.) & LEECH (J. G. C.). *The layer-lattice in relation to mineral chemistry: a review*. Sci. Progr. London, 1937, vol. 31, pp. 641-653, 3 figs.

— *Some aspects of clay chemistry*. Sci. Journ. Roy. Coll. Sci. London, 1937, vol. 7, pp. 69-78, 4 figs.

review of the structure and composition of clay minerals based on conception of layers of  $\text{Si}_2\text{O}_3(\text{OH})_2$ ,  $\text{Al}_2(\text{OH})_6$ , and  $\text{Mg}_3(\text{OH})_6$ . [M.A. 54, 465; 5-359; 6-234.]  
L. J. S.

ELHARDT (Wolf von). *Über silikatische Tonminerale*. Fortschr. Min. Krist. Petr., 1937, vol. 21, pp. 276-340.

detailed summary of the literature on the clay minerals, tabulating chemical analyses and numerical data, and giving 123 references to recent papers.  
L. J. S.

ARK (G. L.), GRIM (R. E.), & BRADLEY (W. F.). *Notes on the identification of minerals in clays*. Zeits. Krist., 1937, vol. 96, pp. 322-324, 4 figs.

owing to the tendency of wet clay particles as they dry to orientate themselves with their cleavage faces parallel to a surface, it is possible to obtain a fibre-diagram from a single orientated flake in diffraction. This is of value in identifying the various minerals mica, kaolin, montmorillonite, &c., found in clays.  
H. H.

EN (F. A. van). *Über den Einfluß verschiedener Flüssigkeiten auf den Brechungsindex von Tonmineralien*. Zeits. Krist., 1936, vol. 95, pp. 464-469.

Experimental attempts to obtain the refractive index of clay minerals immersing them in an organic liquid, heating them, and observing temperature at which the mineral and liquid have the same refractive index, showed that the liquid in some cases acted chemically on the mineral, changing its refractive index. The phenomenon was tested successively with seventeen liquids and thirty-three minerals.  
H. H.

NER (John W.). *Densities and structural relationships of kaolinities and anauxites*. Amer. Min., 1937, vol. 22, pp. 855-860, 2 figs.

the differences in the structures of kaolin and anauxite [M.A. 5-187, 2] and the higher  $\text{SiO}_2:\text{Al}_2\text{O}_3$  ratio in anauxite has been explained

as due to the removal of Al and OH, leaving a defect structure with holes. New determinations of the density (by centrifuging in heavy liquids) of analysed material do not support this view. The replacement of tetrahedral  $\text{SiO}_4$  groups by octahedral  $\text{AlO}_2(\text{OH})_4$  groups is not suggested. L. J. S.

MACHATSCHKI (F.). *Note on the structural relationships of kaolinites and anauxites.* Amer. Min., 1938, vol. 23, pp. 117–118.

A criticism of the preceding paper.

L. J. S.

NOLL (W.). *Hydrothermalsynthetische Untersuchungen im System  $\text{Al}_2\text{O}_3$ — $\text{SiO}_2$ — $\text{H}_2\text{O}$ .* Fortschr. Min. Krist. Petr., 1935, vol. 19, pp. 46–47.

—— *Mineralbildung im System  $\text{Al}_2\text{O}_3$ — $\text{SiO}_2$ — $\text{H}_2\text{O}$ .* Neues Jahrb. Mineral. Abt. A, 1935, Beil.-Bd. 70, pp. 65–115, 2 pls., 3 text-figs.

—— *Über die Bildungsbedingungen von Kaolin, Montmorillonit, Serpentin, Pyrophyllit und Analcim.* Min. Petr. Mitt. (Tschermak), 1935, vol. 48, pp. 210–247.

Recapitulation of previous papers [M.A. 5–254, 255; 6–54, 353], with further discussion of the bearing of experimental synthesis on the formation in nature of clay minerals and aluminium hydroxides. L. J. S.

MEHMEL (M.). *Beziehungen zwischen Wassergehalt und Lichtbrechung der Tonmineralen Kaolinit, Halloysit und Montmorillonit.* Fortschr. Min. Krist. Petr., 1937, vol. 21, pp. 80–83, 2 figs.

—— *Beitrag zur Frage des Wassergehaltes der Minerale Kaolinit, Halloysit und Montmorillonit.* Chemie der Erde, 1937, vol. 11, pp. 1–16, 6 figs.

Loss of water was determined at different vapour pressures and at different temperatures, and the refractive indices of the dehydrated material were determined. Halloysite ( $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 4\text{H}_2\text{O}$ ) loses  $2\text{H}_2\text{O}$  at zero vapour pressure or at  $50^\circ\text{C}$ ., and then has the composition of kaolinite but with a different crystal-structure [M.A. 6–181]. This modified halloysite then loses water at  $400$ – $450^\circ\text{C}$ . like kaolinite. Montmorillonite shows a steady loss up to about  $200^\circ\text{C}$ ., and the remainder of the water is lost at  $400$ – $450^\circ\text{C}$ . L. J. S.

NOLL (W.). *Über das Vorkommen von Montmorillonit in einigen Zeolith-Produkten von Basalten des westlichen Vogelsberges.* Chemie der Erde, 1937, vol. 11, pp. 294–306, 1 fig.

Clayey material ('bole') found in fissures and pockets in weathered basalt at several localities was found in most cases to show the X-ray

ern of montmorillonite. The refractive index is also near that of montmorillonite from Montmorillon (1.541 on material dried at  $110^{\circ}$ ). White bole from Langsdorf gave  $\text{SiO}_2$  50.72,  $\text{Al}_2\text{O}_3$  15.97,  $\text{Fe}_2\text{O}_3$  2.14,  $\text{CaO}$  1.99,  $\text{H}_2\text{O} +$  7.84,  $\text{H}_2\text{O} -$  15.92 = 100.31, and the dehydration curve is similar to that of montmorillonite; the excess of (over  $\text{Al}_2\text{O}_3:\text{SiO}_2 = 1:2$ ) is no doubt due to admixed quartz. The spacing  $d_{001}$  ranges from 19.18 Å. for moist material, 14.46 air dried, to 7 dried at  $110^{\circ}$ . The formation of montmorillonite is favoured with Mg-rich rock and alkaline solutions: under other conditions kaolin formed [M.A. 6-353].

L. J. S.

HMANN (U.) & BILKE (W.). *Über die innerkristalline Quellung und das Basenaustauschvermögen des Montmorillonits*. Kolloid-Zeits., 1936, vol. 77, pp. 238-251, 5 figs.

New analytical, X-ray, base-exchange, and optical data are given for bentonitic montmorillonite. The X-ray data do not support the structure proposed by J. W. Gruner [M.A. 6-180], but rather suggest  $\text{Si}_8\text{Al}_4\text{O}_{28}(\text{OH})_4$  layers, having a structure approximating to that proposed by U. Hofmann, K. Endell, and D. Wilm [M.A. 5-474] and by Gruner, are piled at regular intervals, but without any regularity or parallelism in the arrangement of successive layers. The specific gravity shows that the water absorbed at vapour pressures up to 9 mm. is almost wholly taken up within the lattice; at higher degrees of hydration part of the water taken up is adsorbed on the surfaces of the particles. The (001) spacing of moist montmorillonite varies with the base-exchange cations present and with the pH of the liquid. This and other facts indicate that a large fraction of the base-exchange cations enter into the crystal lattice, and are not merely adsorbed at the surface of the particles.

M. H. H.

G (Hermann). *Montmorillonite vom Dolmar bei Meiningen*. Chemie der Erde, 1937, vol. 11, pp. 217-222, 1 fig.

Pockets and crevices in basalt contain a white to brown clay with pink streaks. The pink material gave  $\text{SiO}_2$  47.98,  $\text{TiO}_2$  0.53,  $\text{Al}_2\text{O}_3$  16.77,  $\text{Fe}_2\text{O}_3$  0.51,  $\text{MgO}$  6.04,  $\text{CaO}$  2.36, alkalis trace,  $\text{H}_2\text{O} +$  8.75,  $\text{H}_2\text{O} -$  17.29 = 100.23; sp. gr. 1.98,  $n$  1.480.

L. J. S.

G (Hermann). *Zur Kenntnis des Montmorillonits*. Chemie der Erde, 1937, vol. 11, pp. 287-293.

Analysis of the more abundant pale yellow clay associated with the (preceding abstract) gave  $\text{SiO}_2$  48.49,  $\text{TiO}_2$  0.73,  $\text{Al}_2\text{O}_3$  13.37,  $\text{Cr}_2\text{O}_3$

0.02,  $\text{Fe}_2\text{O}_3$  5.56,  $\text{FeO}$  0.16,  $\text{MgO}$  5.89,  $\text{CaO}$  2.65,  $\text{P}_2\text{O}_5$  0.14,  $\text{H}_2\text{O} + 7\text{H}_2\text{O} - 16.14 = '100.49'$ ; sp. gr. 2.03,  $n$  1.546–1.553. The lines of X-ray powder photographs show some differences from those of montmorillonite [M.A. 6–136].

L. J. S.

BRADLEY (W. F.), GRIM (R. E.), & CLARK (G. L.). *A study of the behavior of montmorillonite upon wetting*. Zeits. Krist., 1937, vol. 97, pp. 216–222, 2 figs.

A study of the X-ray pictures obtained from montmorillonite shows that on wetting five hydrates are formed in succession containing 2, 14, 20, 26 molecules of water per unit cell respectively.

H. H.

TOMLINSON (W. Harold) & MEIER (Adolph E.). *On the origin of montmorillonite*. Amer. Min., 1937, vol. 22, pp. 1124–1127, 2 figs.

The plagioclase ( $\text{Ab}_6\text{An}_1$ ) of a gabbroid rock at Glen Riddle, Delaware Co., Pennsylvania, shows stages of alteration to a clay mineral which is identified as montmorillonite. Analysis gave  $\text{SiO}_2$  48.79,  $\text{Al}_2\text{O}_3$  20.0,  $\text{MgO}$  5.40,  $\text{CaO}$  0.38, alkalis 0.80,  $\text{H}_2\text{O} + 8.24$ ,  $\text{H}_2\text{O} - 15.50 = 99.0$  corresponding with  $2\text{MgO} \cdot 3\text{Al}_2\text{O}_3 \cdot 12\text{SiO}_2 \cdot 7\text{H}_2\text{O} \cdot \text{aq}$ . The alteration has been affected by magnesian solutions from an adjoining pyroxenite mass. The barium-felspar intergrown with the plagioclase has not been attacked.

L. J. S.

NEWTON (E. F.). *The petrography of some English fuller's earths and rocks associated with them*. Proc. Geol. Assoc. London, 1937, vol. 4, pp. 175–197, 4 pls., 1 text-fig.

Describes the fuller's earth occurrences in Surrey, Bedfordshire, and Somerset, and their mineral composition. The Nutfield 'buffstone' is also described, and the relative abundance of heavy minerals in this and other rocks associated with the fuller's earth is also studied. Colourless cleavage flakes already described by previous observers [M.A. 1–328] of the fuller's earth have been concentrated. Chemical analysis shows the mineral to be anorthoclase, that from Nutfield (anal. I) corresponds to  $\text{Or}_6\text{Ab}_9\text{An}_2$ , and from Combe Hay, Somerset (anal. II, also P. trace) to  $\text{Or}_7\text{Ab}_{10}\text{An}_2$ . Spinel, zircon, apatite, and zinc-blende occur in practically unworn condition in the fuller's earth. Consideration of the situation of the deposits and of the composition of the earths leads to the conclusion that they were deposited in shallow-water areas protected from normal sedimentation, and that the deposition is due to some sort of chemical action. Spinel, apatite, felspar, and zinc-blende are probably authigenic.

| SiO <sub>2</sub> . | TiO <sub>2</sub> . | Al <sub>2</sub> O <sub>3</sub> . | Fe <sub>2</sub> O <sub>3</sub> . | MgO. | CaO. | Na <sub>2</sub> O. | K <sub>2</sub> O. | H <sub>2</sub> O+. | H <sub>2</sub> O—. | Total. |
|--------------------|--------------------|----------------------------------|----------------------------------|------|------|--------------------|-------------------|--------------------|--------------------|--------|
| 7.21               | 0.11               | 17.89                            | 0.77                             | 0.11 | 1.05 | 5.73               | 5.85              | 1.43               | 0.13               | 100.28 |
| 5.52               | 0.09               | 19.39                            | 0.62                             | —    | 1.10 | 6.35               | 6.58              | 0.42               | 0.40               | 100.47 |

W. C. S.

R (Paul F.). *Attapulgius clay*. Amer. Min., 1937, vol. 22, pp. 534–550, 9 figs.

beds of laminated clay, up to 10 feet thick, occur in sandy and siliceous strata of Miocene age over a wide area around Attapulgius in Marion and Quincy in Florida. It is used on a large scale as fuller's earth for decolorizing oils. The X-ray pattern shows rather diffused halos (together with some due to quartz) agreeing with those of montmorillonite; and, although the refractive indices,  $\alpha$  1.511,  $\gamma$  1.532, and  $\rho$  of MgO are rather higher than those for normal montmorillonite, the material belongs to this species, and there is no need for the name attapulgitite [M.A. 6–150]. Analysis by E. Emendorfer gave SiO<sub>2</sub> 53.42, TiO<sub>2</sub> 0.52, Al<sub>2</sub>O<sub>3</sub> 10.06, Fe<sub>2</sub>O<sub>3</sub> 3.40, FeO 0.18, MnO 0.02, MgO 9.16, CaO 0.02, Na<sub>2</sub>O 0.02, K<sub>2</sub>O 0.64, P<sub>2</sub>O<sub>5</sub> 0.12, CO<sub>2</sub> 0.10, Cl 0.02, SO<sub>3</sub> 0.04, H<sub>2</sub>O (+110°) 9.42, H<sub>2</sub>O (–110°) 11.83 = '99.96'. The flakes are oriented parallel to the bedding; and a similar orientation was obtained experimentally by slow settling in fresh water. This clay is probably a weathering product of crystalline rocks and was deposited slowly in fresh water.

L. J. S.

ARENT (Jacques de). *A propos de l'attapulgitite*. Zeits. Krist., 1937, vol. 97, pp. 237–239, 2 figs.

The author replies to P. F. Kerr [preceding abstract], who had stated that the author's attapulgitite was really montmorillonite. H. H.

ARENT (Jacques de). *Caractère minéralogique des smectites. Application à la détermination de quelques terres à foulon de la France métropolitaine, susceptibles d'être utilisées comme terres décolorantes*. Ann. Off. Combustibles liquides, Paris, 1936, pp. 863–943, 3 pls. 23 text-figs.

Thermal and dehydration curves and X-ray patterns are given for montmorillonite, attapulgitite, sepiolite, and montmorillonite, and for several bentonite clays from French localities. [M.A. 6–135, 150, 237, 346,

L. J. S.

ARENT (Jacques de). *Sur les kaolinites activables*. Compt. Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 937–939. Correction, p. 1092. X-rays of the kaolinite-halloysite group cannot as a rule be activated

so as to be absorbent of colouring matter; such as are so activable usually found to contain some attapulgite. A clay from the Sparna of Ivry, near Paris, although distinctly activable, showed only a kaolin diagram when examined by X-rays, but the thermal diagram differs both from the inactivable kaolinite containing earths and from the activable earths containing montmorillonite. Analysis showed not only an excess of  $\text{H}_2\text{O}$  and  $\text{SiO}_2$ , giving a composition somewhat resembling anauxite. It is suggested that the  $\text{SiO}_4$  tetrahedra of kaolinite are partially converted into  $\text{Si}(\text{O},\text{OH})_4$ , and that the  $(\text{OH})_4 \cdot \text{Al}_2 \cdot \text{Si}_2\text{O}_5$  groups become  $(\text{OH})_4 \cdot \text{Al}_{2-x} \cdot \text{Si}_2\text{O}_{5-3x}(\text{OH})_{3x}$ . C. A. J.

LAPPARENT (Jacques de). *Nature minéralogique des argiles d'El Golea (Sahara)*. Compt. Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 1777-1778.

Analysis of a specially pure sample, as free as possible from quartz and felspar sand, of the green clays of El Golea agrees with the formula  $\text{K}_{0.5}\text{Al}_{1.6}\text{Mg}_{0.6}(\text{OH})_2(\text{Si}_3\text{H}_{3.5}\text{O}_{10})$ , which corresponds with an attapulgite with excess of K, and practically identical with bravaisite. The X-ray parameter of both is 10 Å. Bravaisites are defined as alkaline phyllosilicates containing  $(\text{Si}_3\text{H}_{3-x}\text{O}_{10})$ , and glauconites as bravaisites rich in Fe. The former are of lagoon, the latter of marine origin. The El Golea clays disintegrate in water. C. A. J.

LAPPARENT (Jacques de). *Formules structurales et classification des argiles*. Zeits. Krist., 1937, vol. 98, pp. 233-258, 7 figs.

Aluminous clays are classified by means of their structure into three groups, in which the spacing between the basal layers is 7, 10, and 13 Å, respectively: kaolin, anauxites, beidellite, and halloysite; pyrophyllite and attapulgites; montmorillonites and nontronites. The corresponding divisions for non-aluminous clays are serpentine; talc and sepiolite; and theoretical clay near saponite. H. J.

LONGCHAMON (Henri). *Sur les propriétés caractéristiques des palygorskites*. Compt. Rend. Acad. Sci. Paris, 1936, vol. 203, pp. 672-673, 1 fig.

Examination of eighteen samples of palygorskite from various localities shows them to form a definite and homogeneous mineral species. In all the dehydration-temperature curve shows dehydration to occur in three stages at about 20-100°, 200°, and 400°; it is complete by 400° at most. In this respect the palygorskites resemble the sepiolites, but that in the case of these latter dehydration is not complete at 500°, but a fourth stage at about 750°, and with destruction of the lattice. At

perature the lattice of palygorskite is modified to that of palygorskite II, stable at 500–750°. The water in palygorskite I (the form stable at 500°) is zeolitic, but the transformation I→II is irreversible. [Cf. *ibid.* 6–63.]

C. A. S.

DECHAMBON (Henri). *Sur les caractéristiques des palygorskites*. Compt. Rend. Acad. Sci. Paris, 1937, vol. 204, pp. 55–58.

Examination of the same eighteen samples [preceding abstract] with X-rays gave for seventeen almost identical radiograms, which were very analogous to those of the sepiolites, the chief difference being the intense line indicating a spacing of 11·6–12 Å. in the sepiolites replaced by a similar line showing spacings of 10·6–10·8 Å. in the palygorskites. The 18th sample (from Pennsylvania) shows that the planes with this spacing are parallel to the length of the fibres and that the spacing along the length of the fibres is 5·2–5·3 Å. When dehydrated at 350° no change in structure appears during the removal of the zeolitic water, i.e. below 350°. From 350–450° there is contraction perpendicular to the length of the fibre with formation of the structure of palygorskite II; the lattice of this is rapidly destroyed above 775° with formation of lattices identified, somewhat doubtfully, as those of cristobalite, cristobalite, and sillimanite. Results of dilatation curves and thermal analysis are in conformity with the foregoing, which supports Bragg's view (1913) that the palygorskites closely resemble the sepiolites differing therefrom by the isomorphous replacement of Mg by Fe.

C. A. S.

BRAGG (Pierre). *Classification des silicates d'alumine hydratés (latérites)*, du point de vue du pétrographe et du géologue. Compt. Rend. Soc. Géol. France, 1936, pp. 147–149.

In the X-ray diagrams of the clay minerals one line is always specially prominent, indicating the distance,  $d$ , between the (001) planes of easy cleavage. This for kaolinite,  $\text{Al}_4(\text{OH})_3\text{Si}_4\text{O}_{10}$ , is 7 Å., and for pyrophyllite,  $\text{Al}_2(\text{OH})_2\text{Si}_4\text{O}_{10}$ , 9 Å.; in both cases the line is very clear and accompanied by other sharp lines indicating a definite and stable crystal state, which is further confirmed by the thermal analysis and low capacity for adsorption. The minerals with higher values of  $d$ , halloysite,  $\text{Al}_4(\text{OH})_8\text{Si}_4\text{O}_{10} + \text{H}_2\text{O}$  (zeolitic), 10 Å., and montmorillonite,  $\text{Al}_2\text{Mg}(\text{OH})_8\text{Si}_5\text{O}_{10} + \text{H}_2\text{O}$  (zeolitic), 14 Å., are less definite; the lines are often hazy and the X-ray diagram indefinite; and they also exhibit base-exchange. In this class fall the fuller's earths and smectic clays, and perhaps the vermiculites. 12·5 Å. characterizes sepiolite, which is not scaly but

fibrous, and is regarded as one limit of the series of which the other limit is paramontmorillonite (the fibrous variety of montmorillonite in which come the palygorskitic clays with  $d$  12–12.5 Å.; palygorskite itself  $(\text{Al}_{4/3}, \text{Mg})(\text{OH})_2\text{Si}_4\text{O}_{10} + \text{H}_2\text{O}$  (zeolitic), has  $d$  12 Å. Attapulgite  $(\text{Al}_{2/3}, \text{Mg})\text{H}_8\text{Si}_3\text{O}_{12}$  with  $d$  10 Å. lies between the scaly and fibrous groups. In the bentonites and nontronites the montmorillonite is probably colloidal. C. A. S.

DEMOLON (Albert) & BASTISSE (Étienne). *Genèse des colloïdes argileux dans l'altération spontanée d'un granite en case lysimétrique*. Comptes Rend. Acad. Sci. Paris, 1936, vol. 203, pp. 736–738.

Granite in pieces 2–4 mm. was placed in boxes with arrangement to collect all rain-water passing through, and exposed to the open air for five years, no vegetation being allowed to grow. Mechanical analysis then showed almost equal amounts of fragments 2–1 mm., 1–0.2 mm. and less than 0.2 mm.; about 0.8% was clay (less than  $2\mu$ ). No alteration in composition was shown by fragments greater than  $200\mu$ ; below  $200\mu$  separate analyses of the different fractions show that the smaller the size the less the proportion of  $\text{SiO}_2$  and the greater that of sesquioxides and water. Percentages of CaO and MgO increased, and that of FeO remained nearly constant. The drainage water contained  $\text{SiO}_2$ , FeO, MgO, and CaO. C. A. S.

ŠPALEK (Vladimír). *Vznik a stáří jihomoravských kaolinů u Znojma*. [Origin and age of southern Moravian kaolins near Znojmo.] Věstník Přírodní, Praha, 1936, vol. 17, pp. 202–206.

In the gneissic region of southern Moravia, kaolin deposits were formed during the Miocene period by the action of organic acids from moraine. These are now found under lacustrine sediments, while in parts covered by the marine transgression no kaolin was formed. F.

KRATOCHVÍL (František). *Pisolitická lateritová hornina z křídového útvaru od Železnice*.—*La latérite pisolitique au terrain crétacé près de Jihlava (Bohême orient.)*. Věstník Státního Geol. Ústavu Československé Republiky, 1936, vol. 12, pp. 165–176, 5 figs. (Czech with French résumé.)

A pisolitic rock at the base of the Cretaceous at Železnice near Jihlava consists, both in the pisolites and in the matrix, of kaolin (determined by chemical analyses, dehydration curves, specific gravity, and refractive indices) and hydrated iron oxides (limonite and little goethite) and some magnetite. The iron oxides are concentrated in the pisolites.

ially in their central portion. The rock has been derived from a  
tic gel of silica, alumina, and ferric oxide, as in the French bauxites.

F. S.

OGOSYAN (K. S.)] Никогосян (X. C.). Физико-химическое исследо-  
вание накрита окрестностей г. Симферополя.—НИКОГОССИАН  
(H. S.). *Physical and chemical investigations of nacrite* [from the  
neighbourhood of Mt. Simferopol]. Труд. Петр. Инст. Акад.  
Наук СССР (Trav. Inst. Pétrogr. Acad. Sci. URSS), 1934, no. 6,  
pp. 443-451, 4 figs. (Russian with English Summary.)

white scaly mineral with a pearly lustre, and believed to be nacrite,  
and in a vein of hydrothermal origin cutting through albite-diabase  
ski-Orda, near Simferopol, Crimea. Analysis gave  $\text{SiO}_2$  45.99,  
39.16,  $\text{Fe}_2\text{O}_3$  0.34,  $\text{MgO}$  0.09,  $\text{CaO}$  0.17,  $\text{Na}_2\text{O}$  0.14,  $\text{K}_2\text{O}$  0.27,  
trace, ign. loss 13.70 = 99.86. Its optical properties are:  $\alpha$  1.560,  
1.563,  $\gamma$  1.566, negative,  $2V$   $80^\circ$ , extinction-angle  $10-13^\circ$ . The heating  
curve gives a terrace at  $460-500^\circ$  and a hump at  $900-1000^\circ$ . The  
dehydration curve shows the loss of the constitutional water at  $400-500^\circ$ .  
Refractive index of the products of dehydration show little change  
at  $350^\circ$  ( $\beta$  1.561), a rapid change from  $400^\circ$  ( $\beta$  1.540) to  $500^\circ$  ( $\beta$  1.509),  
then a steady increase at  $800^\circ$  ( $\beta$  1.528). S. I. T.

ANKIN (D. S.) & IVANOVA (V. P.)] BELJANKIN (D.) und IWANOWA  
(W.). *Drei Kaoline*. Zentr. Min., Abt. A, 1935, pp. 298-308, 8 figs.  
Three types were examined. I, compact white kaolin with fine scaly  
texture, forming a vein in alunite at Saglik, Trans-Caucasia, where it  
has been formed by the action of sulphur springs on volcanic tuffs;  
 $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ . II, asbestos-like white kaolin with platy-fibrous  
texture, occurring in crevices in alunite at Saglik;  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2.8\text{H}_2\text{O}$ .  
III, compact white to bluish halloysite from the nickel deposit at Aidarly,  
Dagestan [M.A. 6-150];  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2.9\text{H}_2\text{O}$ . Heating curves of all three  
show an endothermic effect at  $500-600^\circ\text{C}$ . and an exothermic effect  
at  $600-990^\circ\text{C}$ .; and dehydration curves are in four stages with corre-  
sponding changes in  $n$ . They all behave like kaolin, from which II and  
III differ only in the degree of hydration (hydrokaolin).

| $\text{SiO}_2$ | $\text{Al}_2\text{O}_3$ | $\text{Fe}_2\text{O}_3$ | $\text{MgO}$ | $\text{CaO}$ | $\text{H}_2\text{O}+$ | $\text{H}_2\text{O}-$ | Total   | $n_a$       | $n_\gamma$ |
|----------------|-------------------------|-------------------------|--------------|--------------|-----------------------|-----------------------|---------|-------------|------------|
| 45.54          | 39.50                   | 0.06                    | 0.06         | nil          | 14.44                 | 0.22                  | '99.92' | 1.560       | 1.567      |
| 43.20          | 38.26                   | nil                     | trace        | 0.22         | 14.28                 | 4.48                  | 100.61  | 1.526-1.543 |            |
| 43.27          | 37.41                   | 0.11                    | nil          | nil          | 14.42                 | 4.95                  | 100.32  | 1.543       |            |

also traces  $\text{Na}_2\text{O}, \text{K}_2\text{O}, \text{CO}_2$ . II, also  $\text{CO}_2$  0.17. III, also  $\text{Cr}_2\text{O}_3$  0.16.

L. J. S.

[AFANASIEV (G. D.)] Афанасьев (Г. Д.). О нонтроните коры выветривания северо-западного Алтая.—AFANASIEV (G. D.). *On nontro from the crust of weathering on the slopes of the north-western A* Труд. Петр. Инст. Акад. Наук СССР (Trav. Inst. Pétrogr. A Sci. URSS), 1936, no. 7-8, pp. 135-153, 3 figs. (Russian with English summary.)

A green clay from the zone of weathering was found to be almost entirely composed of flakes and fibres of chromo-ferric beidellite. Analyses of two samples gave:  $\text{SiO}_2$  40.62 (42.88),  $\text{TiO}_2$  0.07 (1.00),  $\text{Al}_2\text{O}_3$  19.00 (15.61),  $\text{Cr}_2\text{O}_3$  0.53 (0.68),  $\text{Fe}_2\text{O}_3$  14.25 (16.61),  $\text{FeO}$  0.89 (0.90),  $\text{MgO}$  0.60 (0.65),  $\text{BaO}$  0.08 (—),  $\text{CaO}$  10.44 (4.60),  $\text{Na}_2\text{O}$  0.19 (0.20),  $\text{K}_2\text{O}$  0.95 (—),  $\text{H}_2\text{O} +$  4.98 (6.64),  $\text{H}_2\text{O} -$  7.43 (9.92) = 100.03 (98.98). The optical properties of the mineral are:  $\alpha$  1.559 (1.559),  $\beta$  1.585 (1.585),  $\gamma$  1.585 (1.588),  $2V$  about  $30^\circ$ , negative, pleochroism marked. The mineral also contains small amounts of altered feldspar, pyroxene, &c. The heating curve shows terraces at  $92-120^\circ$ ,  $463-553^\circ$ , and  $911^\circ$ . Its relation to kaolinite and its constitutional formula are discussed. S. I. 5

[ЕФРЕМОВ (N. E.)] Ефремов (Н. Е.). Нефедьевит и кеффекилит из Лабинского района на северном Кавказе.—ЕФРЕМОВ (N. E.). *Nefedievite and keffekilite from the Laba-region, northern Caucasus* Зап. Всеросс. Мин. Общ. (Mém. Soc. Russe Min.), 1936, series 1, vol. 65, pp. 99-107. (Russian with English summary.)

Two samples of bentonitic clay are described. Pinkish-white unctuous clay, interbedded among Miocene sandstones, is microscopically homogeneous and consists of a fibrous-sealy aggregate of crystalline minerals ( $n$  1.535) with a small amount of other minerals. In its composition (anal. I) it corresponds to keffekilite. Greenish-grey unctuous clay interbedded among Cretaceous limestones, the bulk of which consists of a fibrous crystalline aggregate ( $n$  1.530), and in composition (anal. II) corresponds to nefedievite.

|     | $\text{SiO}_2$ . | $\text{Al}_2\text{O}_3$ . | $\text{Fe}_2\text{O}_3$ . | $\text{MgO}$ . | $\text{MnO}$ . | $\text{CaO}$ . | $\text{H}_2\text{O} +$ . | $\text{H}_2\text{O} -$ . | Total. | Sp. |
|-----|------------------|---------------------------|---------------------------|----------------|----------------|----------------|--------------------------|--------------------------|--------|-----|
| I.  | 50.07            | 24.09                     | 2.53                      | 2.20           | trace          | 2.04           | 4.80                     | 14.00                    | 99.73  | 2   |
| II. | 50.62            | 15.20                     | 3.71                      | 4.55           | —              | 3.14           | 7.20                     | 15.08                    | 99.50  | 2   |

S. I. 5

### Miscellaneous.

RAMDOHR (P.). *Bleiglanz, Schapbachit, Matildit*. Fortschr. Min. K. Petr., 1936, vol. 20, pp. 56-57.

Schapbachite ( $3\text{AgBiS}_2 \cdot 2\text{PbS}$ ) is an intimate oriented intergrowth of matildite ( $\text{AgBiS}_2$ ) and galena ( $\text{PbS}$ ). The suggestion is that a h

temperature form  $\alpha$ -AgBiS<sub>2</sub> (perhaps represented by plenargyrite) is isomorphous with galena. The low-temperature form  $\beta$ -AgBiS<sub>2</sub> (matildesite) is orthorhombic with unit cell dimensions  $a$  8.08,  $b$  7.82,  $c$  5.65 Å.,  $2a$  5.71,  $\sqrt{2}b$  5.5,  $c$  5.65 Å., compared with  $a$  5.89 Å., for galena).

L. J. S.

FRITSCH (Haymo). *Ein Beitrag zur Morphologie des Axinites. I. Die Kristallorientierung an den Flächen des Axinites.* Zeits. Krist., 1937, vol. 96, pp. 249–272, 14 figs. *II. Formendiskussion.* Ibid., pp. 337–356, 1 fig. Principal and striated faces are described. A list of crystal-forms known on axinite is given with the names of their discoverers and a bibliography.

H. H.

FRANKE (Heinz). *Eine neue Trachtvariante des Titanits.* Zeits. Krist., 1937, vol. 97, pp. 332–335, 3 figs.

Mineral from two new localities in Styria has a habit in which the (221) predominates.

H. H.

FRÉCHET-KARDOSS (Elemér). *Adatok a fuchsitek optikai ismeretéhez.* [Data for the optical knowledge of the fuchsites.] Mat. Term.-tud. Közlemények, Budapest, 1937, vol. 56, pp. 346–351.

FRÉCHET-KARDOSS (E. von). *Beiträge zur Kenntnis des Chromglimmers.* Publ. Dept. Mining & Metallurgy, Roy. Hungarian Palatine-Joseph University, Sopron, 1937, vol. 9, pp. 186–191.

Fuchsite from Rende, Kőszeg Mts., com. Vas, Hungary, gave  $\alpha$  1.572,  $\beta$  1.609,  $2V$  33° 50′–35° 58′; from Velem, Kőszeg Mts.,  $\alpha$  1.572,  $\beta$  1.605,  $\gamma$  1.607,  $2V$  30° 5′–37° 56′,  $r > v$ ,  $\alpha$  greenish-blue,  $\beta$  yellowish-blue,  $\gamma$  bluish-green; from Zillerthal 2E 43° 16′–52° 49′; and from Ratten, Tyrol, 2E 55° 33′–60° 2′.

V. Z.

GHOSH (M. S.). *On the occurrence and distribution of staurolite in Gangpur State, Bihar and Orissa.* Quart. Journ. Geol. Mining & Metall. Soc. India, 1933, vol. 5, pp. 67–73, 1 pl.

Small crystals 0.12 to 0.5 inch in length, all twins or trillings, from Rengalbera, and larger crystals up to 2.5 inches in length between Rengalbera and Kichinda, and also near Haldipani. Forms  $m$   $c$   $b$   $r$  [a's letters]. Penetration twins on (032) and (232). The crystals are black and opaque, in thin section pleochroic,  $\alpha$  and  $\beta$  colourless or yellow,  $\gamma$  light yellow to orange-yellow. They occur in garnetiferous mica-schists or gneisses. These rocks appear to have been formed under conditions of the meso-zone of Grubenmann, but to have suffered

regressive metamorphism to epi-zone conditions whereby the schists have taken on some of the characters of phyllites with sericite-chlorite assemblages in the groundmass. It is noted that the staurolite is best developed where the schists are in the vicinity of intrusive granite and epidiorite. The intrusive rocks may have helped the development of good crystals by increasing the mobility of the molecules during metamorphism. W. C. S.

BURRI (Conrad), JAKOB (Johann), PARKER (Robert L.), & STRUNZ (Hugo). *Über Hydroxylapatit von der Kemmleten bei Hospenthal (Kt. Uri), Schweiz. Min. Petr. Mitt.*, 1935, vol. 15, pp. 327-339.

Yellowish to greenish apatite in talc-schist has cleavage (10 $\bar{1}$ 0) good, sp. gr. 3.076,  $\omega$  1.6452,  $\epsilon$  1.6413 (Na). The unit cell,  $a$  9.42,  $c$  6.93 ( $c/a$  0.736) contains one molecule  $\text{Ca}_{10}(\text{OH})_2(\text{PO}_4)_6$ . Analysis gave H 42.19, CaO 55.47, MnO 0.06,  $\text{H}_2\text{O} +$  1.73, insol. 0.60 = 100.05; Cl,  $\text{CO}_2$ ,  $\text{SO}_3$  absent. L. J. S.

LEWIS (A. D.). *Fulgurites from Witsands on the south-eastern border of the Kalahari*. South African Geogr. Journ., 1936, vol. 19, pp. 50-57, 9 figs.

In eight square miles of sand-dunes it is estimated that there are about 2000 fulgurites. Broken fragments are found in the hollows between the dunes, but only rarely are they seen in situ projecting 2-3 inches above the surface. Five of these were excavated without reaching the lower end, one to a depth of 8 feet. The varying form of these along their course is described in detail, and the mode of their formation discussed. The average thickness of the fused walls is 0.035 inch. [Cf. M.A. 6-40.]

L. J. S.

PAGLIANI (G.). *La fluorite del granito di Baveno*. [Natura, Milano, 1937, vol. 27, pp. 59-69.] Abstract in Periodico Min. Roma, 1937, vol. 1, p. 74.

The crystals occur in geodes and are of various colours and zones. Predominant forms are  $o$   $d$   $a$ ; 24 forms are noted of which the following are new (940), (441), (551), (661), (771), (881), (772), (992), (11.1) (552). The refractive index  $n_{Na}$  1.4338 shows no perceptible variation in crystals of different colours. L. J. S.

FENOGLIO (M.). *Ricerche sui carbonati naturali neutri e basici di magnesio idrati*. Atti (Rend.) R. Accad. Lincei, Cl. Sci. fis. mat. nat., Roma, 1936, ser. 6, vol. 24, pp. 219-222.

A summary of previous papers [M.A. 5-287, 431; 6-143, 474] repeated.

for nesquehonite ( $\text{MgCO}_3 \cdot 3\text{H}_2\text{O}$ ), lansfordite ( $\text{MgCO}_3 \cdot 5\text{H}_2\text{O}$ ), artinite ( $\text{CO}_3 \cdot \text{Mg}(\text{OH})_2 \cdot 3\text{H}_2\text{O}$ ), and hydromagnesite ( $4\text{MgCO}_3 \cdot \text{Mg}(\text{OH})_2 \cdot 4\text{H}_2\text{O}$ ).

L. J. S.

BI (L.) & MALATESTA (L.). *Germanio, gallio, indio, nella blende di Sardegna*. Rend. Ist. Lombardo Sci. Lett. Milano, 1936, ser. 2, vol. 69, pp. 369–374.

Electroscopic determinations on calcined blende separated by flotation from the ore of Montevecchio gave Ge 0.09–0.16, Ga 0.15–0.30, In 0.07–0.12 per thousand.

L. J. S.

AGANTE (Sergio). *La blende di Corvara in Val di Pennes*. Periodico Min. Roma, 1937, vol. 8, pp. 15–30, 1 pl., 3 text-figs.

Crystals of blende from this locality near Bolzano in Trentino show forms of which  $f$  (771) and  $\lambda$  (15.15.2) are new. Sp. gr. of yellow crystals 4.072, of red 4.093;  $n$  of yellow crystals 2.3433 (red), 2.3665 (yellow), 2.4047 (green), 2.4758 (indigo-violet), of red crystals 2.3674 (yellow). Detailed analyses show Fe 0.21, Cd 0.195, Ga trace, In 0.0095, Pb 0.0076, Ag 0.0026, Cu 0.0016, Bi 0.038, Sb 0.0016, As 0.0089, Zn 0.0017%, Cl 0.0017%.

L. J. S.

LELLI (V.) & CHAUDET (A.). *Sobre dos sulfatos de hierro de la mina "Santa Elena", provincia de San Juan*. Revista Minera Geol. y Min., Soc. Argentina Minería y Geol., 1937, vol. 8, pp. 46–52.

Pyrite veins in diabase in the Alcaparrosa ravine are oxidized in their upper portion to sulphates, mostly copiapite, with botryogen, halobutyrate &c. Dark grey finely granular material gave analysis I, corresponding with  $\text{FeSO}_4 \cdot \frac{1}{2} - \frac{2}{3} \text{H}_2\text{O}$ , which may be a new ferrous sulphate, or identical with ferropallidite or szomolnokite. Pale green fibrous fibroplite gave II,  $\text{Fe}_2\text{O}_3 \cdot 2\text{SO}_3 \cdot 10.87\text{H}_2\text{O}$ .

| $\text{SO}_3$ . | $\text{Fe}_2\text{O}_3$ . | $\text{FeO}$ . | $\text{MgO}$ . | $\text{CaO}$ . | $\text{H}_2\text{O}$ . | S.   | Insol. | Total. | Sp. gr. |
|-----------------|---------------------------|----------------|----------------|----------------|------------------------|------|--------|--------|---------|
| 48.81           | 0.10                      | 40.10          | 0.81           | 1.48           | 7.80                   | —    | 0.40   | 99.50  | 3.036   |
| 30.66           | 30.66                     | —              | —              | —              | 37.44                  | 0.40 | 0.84   | 100.00 | 1.92    |

L. J. S.

VÍK (F.). *Hatchettin z ložiska rumělký u Měrníka*. (Hatchettine from mercury mine at Měrník.) Sborník štátného banského muzea Dionýza Štúra v Banskej Štiavnici [= Schemnitz] (Bull. du Musée minier d'état Dionýz Štúr à Banská Štiavnica, Tchécoslovaquie), 1937, vol. 1 (for 1927–37), pp. 101–104. (Czech with English summary.)

Elastic scales ( $\frac{1}{2}$  cm. across) of hatchettine from a veinlet in dolomite

at Merník in eastern Slovakia are bright yellow, or sometimes pale pink from enclosed cinnabar;  $n \geq 1.519$ , birefringence low,  $2E\ 48-49^\circ$ , positive. Other organic substances from the same locality resemble ozocerite and bitumen. Aragoite, from mercury mines in California, seems to be identical with hatchettine.

L. J. S.

BILLIET (V.). *Uranotiel en sklodowskiet*. Natuurwetensch. Tijdschr. 1936, vol. 18, pp. 284-303, 1 pl. (Flemish with French résumé [Cf. M.A. 6-430.]

Uranotile from Wölsendorf, Bavaria, is orthorhombic with  $a:b:c = 0.4371:1:0.4784$ , and the unit cell,  $a\ 6.68$ ,  $b\ 15.28$ ,  $c\ 7.31\ \text{\AA}$ ., contains two molecules  $\text{CaO} \cdot 2\text{UO}_3 \cdot 2\text{SiO}_2 \cdot 6\text{H}_2\text{O}$ ; sp. gr. 3.809. Sklodowskite from Shinkolobwe, Katanga, has  $a:b:c = 0.4303:1:0.4593$ , and the unit cell,  $a\ 6.67$ ,  $b\ 15.50$ ,  $c\ 7.12\ \text{\AA}$ ., contains two molecules  $\text{MgO} \cdot 2\text{UO}_3 \cdot 2\text{SiO}_2 \cdot 6\text{H}_2\text{O}$ ; sp. gr. 3.776. The two minerals are isomorphous. For cuprosklodowskite only  $c\ 7.23\ \text{\AA}$ . could be determined, and the structure appears to be different.

L. J. S.

QUENSEL (Percy). *Minerals of the Varuträsk pegmatite. VI. On the occurrence of cookeite*. Geol. För. Förh. Stockholm, 1937, vol. 60, pp. 262-268, 4 figs.

——— VII. *Beryl*. Ibid., pp. 269-272.

——— VIII. *The amblygonite group*. Ibid., pp. 455-468, 6 figs. M.A. 6-485-7; 7-10].

Cookeite as fine scaly to fibrous masses is pseudomorphous after tourmaline and spodumene, and it also fills crevices in the rock. Tourmaline after rubellite is pink (anal. I) and that after spodumene is green (anal. II after deducting 52.4% quartz). Beryl forms large rough milky-white prisms resembling quartz (anal. III). Another type of beryl belonging to a later period is clear and vitreous and occurs as small granular nodules (anal. IV) in lepidolite-rock. Amblygonite occurs as rounded single crystals with new forms,  $b\ (010)$  and  $f\ (0\bar{1}1)$  [Dana's axes],  $\alpha\ 1.558$ ,  $\beta\ 1.6093$ ,  $\gamma\ 1.6199$ ,  $2V\ 86^\circ\ 40'$ , sp. gr. 3.027; a partial analysis, F 4.0,  $\text{H}_2\text{O}\ 3.71$ ,  $\text{Li}_2\text{O}\ 9.41$ ,  $\text{Na}_2\text{O}\ 0.95$ , shows a preponderance of the more basic molecule  $\text{Li}(\text{AlOH})\text{PO}_4$ . Compact amblygonite occurring as very large masses gave anal. V. At the contact with microcline it shows a zone of altered material, analysis of which suggests a new lithian variety ('poly-irvingite') much richer in  $\text{SiO}_2$  than irvingite. Analyses I-V by T. Berggren.

| SiO <sub>2</sub> . | Al <sub>2</sub> O <sub>3</sub> . | Fe <sub>2</sub> O <sub>3</sub> . | FeO.                            | MnO.               | MgO.               | CaO.   | BeO.    | Na <sub>2</sub> O.   | K <sub>2</sub> O.  | Li <sub>2</sub> O. |
|--------------------|----------------------------------|----------------------------------|---------------------------------|--------------------|--------------------|--------|---------|----------------------|--------------------|--------------------|
| 38.22              | 43.20                            | 0.08                             | 0.07                            | 0.03               | 0.04               | 0.36   | —       | nil                  | 0.42               | 4.33               |
| 35.25              | 42.58                            | 0.25                             | 0.70                            | 0.06               | 0.59               | 0.51   | —       | nil                  | 1.48               | 0.80               |
| 33.98              | 18.83                            | 0.16                             | —                               | 0.01               | nil                | nil    | 12.87   | 1.09                 | 0.16               | 0.36               |
| 34.16              | 18.73                            | 0.28                             | —                               | nil                | nil                | nil    | 12.98   | 1.27                 | 0.39               | 0.08               |
| —                  | 34.91                            | 0.10                             | 0.03                            | nil                | nil                | nil    | —       | 0.38                 | nil                | 9.98               |
| Cs <sub>2</sub> O. | F.                               | Cl.                              | P <sub>2</sub> O <sub>5</sub> . | H <sub>2</sub> O+. | H <sub>2</sub> O—. | Total. | Sp. gr. | $\alpha(\epsilon)$ . | $\gamma(\omega)$ . |                    |
| —                  | 0.33                             | 0.03                             | 0.11                            | 12.46              | 0.16               | 99.84  | 2.68    | 1.565                | 1.595              |                    |
| —                  | 0.34                             | —                                | trace                           | 13.84              | 3.59               | 100.00 | 2.575   | 1.553                | 1.567              |                    |
| 0.26               | —                                | —                                | —                               | 2.00               | 0.05               | 99.77  | 2.712   | 1.577                | 1.583              |                    |
| 0.42               | —                                | —                                | —                               | 1.44               | 0.02               | 99.77  | 2.725   | —                    | —                  |                    |
| —                  | 2.10                             | —                                | 47.99                           | 5.22               | 0.04               | 100.75 | 3.025   | —                    | —                  |                    |

L. J. S.

NET (V.) & VANDENDRIESSCHE (A.). *Grenats de la région de Bastogne-Libramont*. Bull. Soc. Belge Géol., 1937, vol. 47, pp. 222–244, 3 pls., 5 text-figs.

Small garnets in graphitic quartzite with variable amounts of chlorite, hibole, biotite, ilmenite, &c., were examined [M.A. 2–473]. They typically contain enclosures, but pure material with  $d$  4.02,  $n$  1.805,  $2\theta$  62 Å., gave on analysis SiO<sub>2</sub> 37.38, Al<sub>2</sub>O<sub>3</sub> 19.08, Fe<sub>2</sub>O<sub>3</sub> 1.81, FeO 0.16, MnO 16.26, MgO 0.67, CaO 9.55, ign. 0.39 = 100.53, corresponding sp. 37.1, al 35.0, gr. 20.1, an. 5.7, py. 2.1%. Garnets from eight localities gave  $d$  4.01–4.04,  $n$  1.790–1.810,  $a$  11.62–11.66 Å., showing little variation; but plots of these data do not give precise estimates of the chemical composition [M.A. 3–433]. The garnet is the most formed mineral in these metamorphic rocks, and as the rocks themselves contain little Ca and Mn, these elements probably came from a magmatic source.

L. J. S.

SCHER (Michael). *The relation between chemical composition and physical properties in the garnet group*. Amer. Min., 1937, vol. 22, pp. 751–759. The data given by many garnet analyses published since the paper of Ford 1915 [M.A. 2–37] are tabulated, and found to be in agreement with his conclusions. Analyses showing >0.5% TiO<sub>2</sub> are omitted as the value of this is doubtful. The constants given by C. H. Stockwell [M.A. 3–433] for the pure molecules are slightly modified.

|             |     |     | $n$ . | Sp. gr. | $d$ (calc. from a). | $a$ .     |
|-------------|-----|-----|-------|---------|---------------------|-----------|
| Grossular   | ... | ... | 1.735 | 3.530   | 3.582               | 11.840 Å. |
| Andradite   | ... | ... | 1.895 | 3.835   | 3.838               | 12.045    |
| Uvarovite   | ... | ... | 1.870 | 3.775   | —                   | 12.050    |
| Almandine   | ... | ... | 1.830 | 4.325   | 4.325               | 11.495    |
| Spessartine | ... | ... | 1.800 | 4.180   | 4.196               | 11.590    |
| Pyrope      | ... | ... | 1.705 | 3.510   | 3.554               | 11.440    |

L. J. S.

GALOPIN (R.). *Différenciation chimique des minéraux métalliques par méthode des empreintes*. Schweiz. Min. Petr. Mitt., 1936, vol. pp. 1-18.

Paper moistened with acid is pressed against a polished ore specimen and then treated with reagents for spot tests. The reactions for various elements and minerals are listed. [M.A. 6-377.] L. J.

HILLER (Théodore). *Sur l'application de la méthode des empreintes à la détermination des minéraux opaques en section polie*. Schweiz. Min. Petr. Mitt., 1937, vol. 17, pp. 88-145, 4 pls., 4 text-figs.; separated as Thèse no. 970, Genève, 1937.

A connected account of previous papers [M.A. 6-377] with full details and tabulated reactions for various chemical elements.

L. J. S.

DOLAR-MANTUANI (L.). *Rhodochrosit von Trepča*. Zeits. Krist., 1937, vol. 98, pp. 181-184, 2 figs.

Rhodochrosite from the zinc-lead mines at Trepča, Kosovska Mitrovica, central Serbia, consists of crystals, some of which have the usual rhombohedral form, while others are of columnar habit. The prismatic columns do not possess crystal faces, but are covered with a veneer of small rhombohedral crystals. Analysis gave MnO 44.60, FeO 9.15, MgO 1.65, CaO 4.56, ZnO 0.13,  $Al_2O_3$  0.33,  $Fe_2O_3$  0.14,  $CO_2$  39.02, in total 100.14,  $H_2O$  0.11 = 100.28.

H. F.

TOKODY (L.). *Cerussit von Felsőbánya und Almásbánya*. Zeits. Krist., 1937, vol. 96, pp. 325-328, 2 figs.

To complete his previous monograph [M.A. 3-302] the author describes cerussite from two more localities, Felsőbánya (com. Szatmárnémeti) and Almásbánya (com. Arad).

H.

MEIXNER (Heinz). *Das Mineral Lazulith und sein Lagerstättenverhältnis*. Berg- und Hüttenm. Jahrb. Montan. Hochsch. Leoben, 1937, vol. 85, pp. 1-22, 33-49, 1 fig.

A detailed historical account is given of lazulite and its occurrence and paragenesis at various localities (about which there has been some confusion) particularly in the Austrian Alps. The mineral usually occurs in quartz veins of hydrothermal origin. From a discussion of analyses (five new) the formula deduced is  $(OH)_2R_2P_2O_8$ , where R = Al, Fe, Ca, Mn.

L. J.